



US011513556B2

(12) **United States Patent**
Stryker et al.

(10) **Patent No.:** **US 11,513,556 B2**
(45) **Date of Patent:** **Nov. 29, 2022**

(54) **ACCESSORY COVER FOR A PORTABLE ELECTRONIC DEVICE**

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)
(72) Inventors: **James A. Stryker**, San Francisco, CA (US); **Caitlin M. Mclain**, San Jose, CA (US); **Travis C. Pedley**, Scotts Valley, CA (US); **Nicholas A. Treadwell**, Cupertino, CA (US); **Hao Zhu**, San Jose, CA (US); **Yang Zhou**, San Jose, CA (US)

(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 179 days.

(21) Appl. No.: **16/277,999**

(22) Filed: **Feb. 15, 2019**

(65) **Prior Publication Data**
US 2020/0081489 A1 Mar. 12, 2020

Related U.S. Application Data
(60) Provisional application No. 62/728,524, filed on Sep. 7, 2018.

(51) **Int. Cl.**
A45C 11/00 (2006.01)
G06F 1/16 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *G06F 1/1628* (2013.01); *A45C 11/38* (2013.01); *A45C 13/1069* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC ... A45C 11/38; A45C 13/005; A45C 13/1069; A45C 2011/002; A45C 2011/003; G06F 1/1628
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,000,871 B2* 4/2015 Cencioni G06F 1/1626 335/219
9,419,669 B2 8/2016 Smith et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 202257394 U 5/2012
CN 203073388 U 7/2013
(Continued)

OTHER PUBLICATIONS

International Patent Application No. PCT/US2019/023929—
International Search Report and Written Opinion dated Jul. 11, 2019.

(Continued)

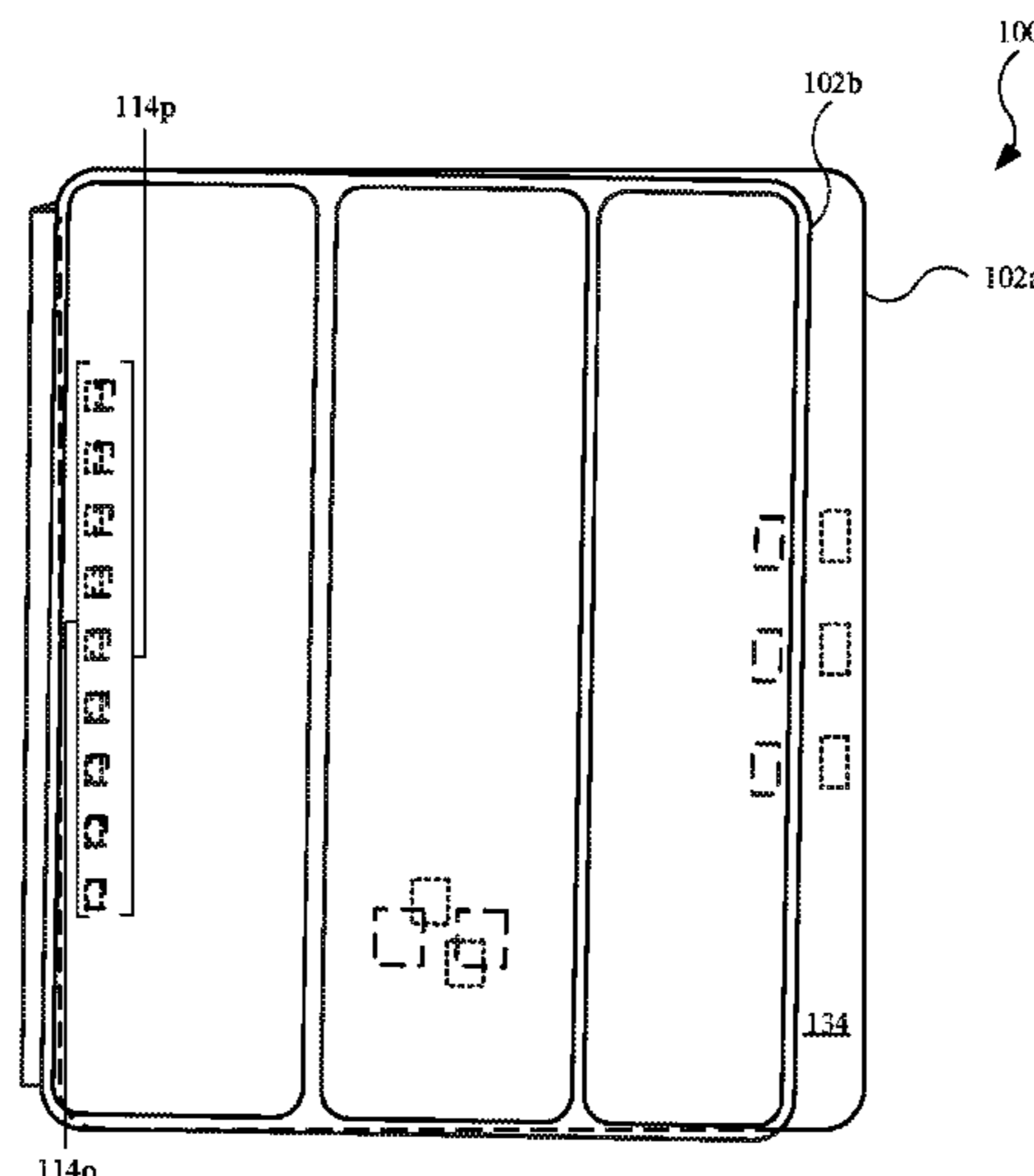
Primary Examiner — King M Chu

(74) *Attorney, Agent, or Firm* — BakerHostetler

(57) **ABSTRACT**

An accessory device for a portable electronic device is described. The accessory device includes a front cover connected to a back cover. The front cover includes multiple segments rotatable with respect to each other. The segments include magnets that allow the segments, through magnetic coupling, to couple with another segment or with the portable electronic device. When the front cover engages the back cover, a user may remove, or pull away, a segment from the back cover, causing the remaining segments to sequentially fall away from the back cover. In some instances, when the front cover at least partially engages the back cover, one of the segments includes magnets designed to couple with magnets in the back cover, but not with magnets in another segment. The accessory device may further include an opening that receives a camera assembly of the portable electronic device and forms a mechanical interlock.

20 Claims, 12 Drawing Sheets



- (51) **Int. Cl.**
A45C 11/38 (2006.01)
A45C 13/10 (2006.01)
- (52) **U.S. Cl.**
 CPC *G06F 1/1626* (2013.01); *G06F 1/1681*
 (2013.01); *A45C 2011/002* (2013.01); *A45C*
2011/003 (2013.01); *G06F 2200/1633*
 (2013.01); *G06F 2200/1634* (2013.01)
- (58) **Field of Classification Search**
 USPC 206/320
 See application file for complete search history.

(56) **References Cited**
 U.S. PATENT DOCUMENTS

9,559,742	B2	1/2017	Ye et al.
9,733,669	B1	8/2017	Scales et al.
10,211,874	B2	2/2019	Kao et al.
2012/0069503	A1	3/2012	Lauder et al.
2012/0268891	A1*	10/2012	Cencioni G06F 1/1656 361/679.55
2013/0277271	A1	10/2013	Toulotte
2013/0328917	A1	12/2013	Zambetti et al.
2014/0036438	A1*	2/2014	Gioscia G06F 1/1628 361/679.55
2015/0049426	A1*	2/2015	Smith G06F 1/1628 361/679.27
2015/0138697	A1	5/2015	Murauyou et al.

2015/0141092	A1	5/2015	Murauyou et al.
2015/0263776	A1*	9/2015	Shyu A45C 13/002 455/575.8
2015/0359120	A1*	12/2015	Huang A45C 13/005 206/45.23
2017/0068282	A1	3/2017	Smith et al.
2017/0070001	A1	3/2017	Degner et al.
2017/0235339	A1*	8/2017	Scales G06F 1/1626 361/679.56
2018/0191394	A1*	7/2018	Kao A45C 11/00

FOREIGN PATENT DOCUMENTS

CN	203720729	U	7/2014
CN	204215311	U	3/2015
CN	107006985	A	8/2017
CN	108268092	A	7/2018
WO	2016163659	A1	10/2016

OTHER PUBLICATIONS

Utility Model Patentability Evaluation Report (UMPER) dated Dec. 31, 2019.
 Chinese Patent Application No. 201980051485.5—First Office Action dated Dec. 21, 2021.
 Chinese Patent Application No. 201980051485.8—Second Office Action dated May 5, 2022.

* cited by examiner

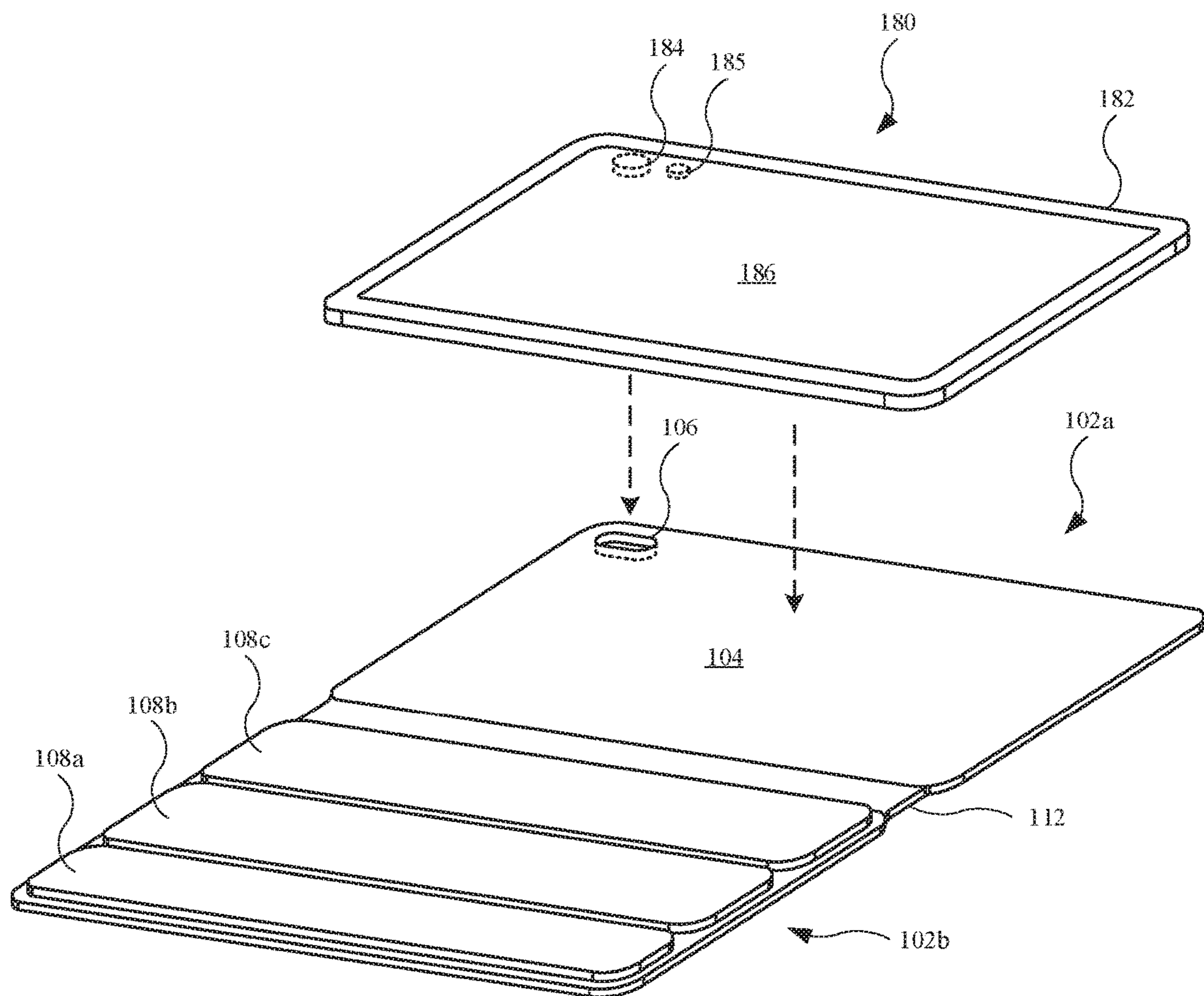


FIG. 1

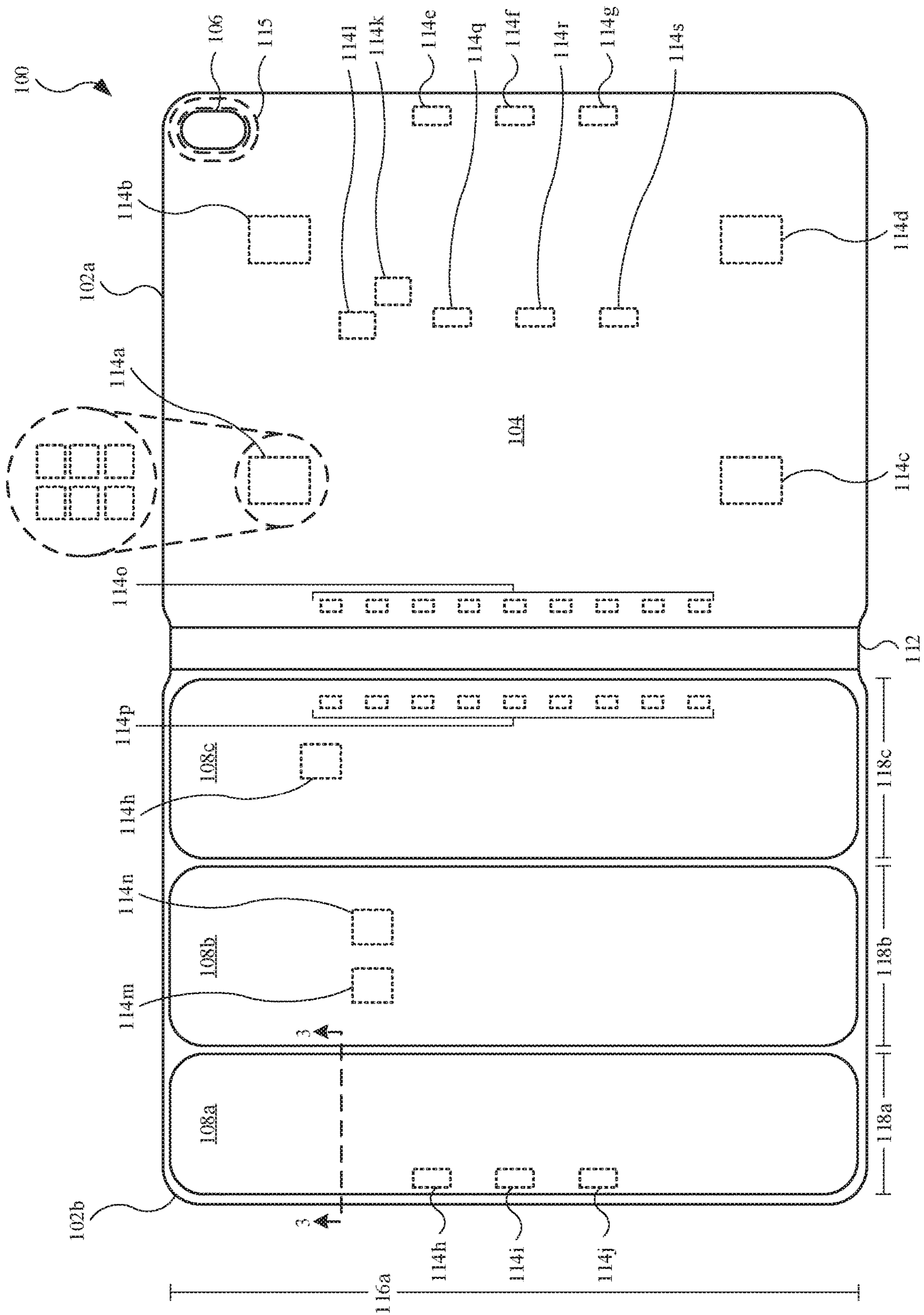


FIG. 2

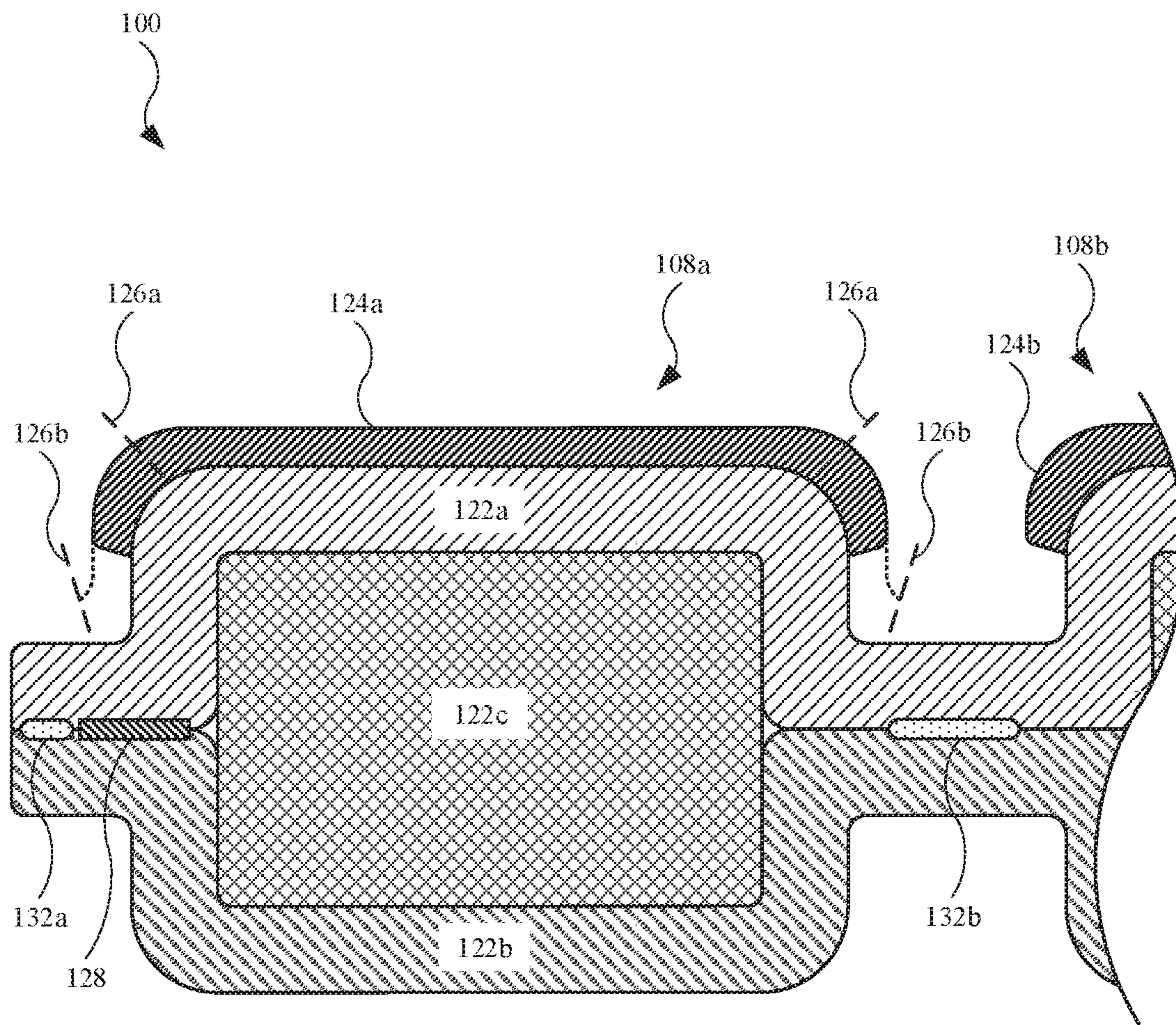


FIG. 3

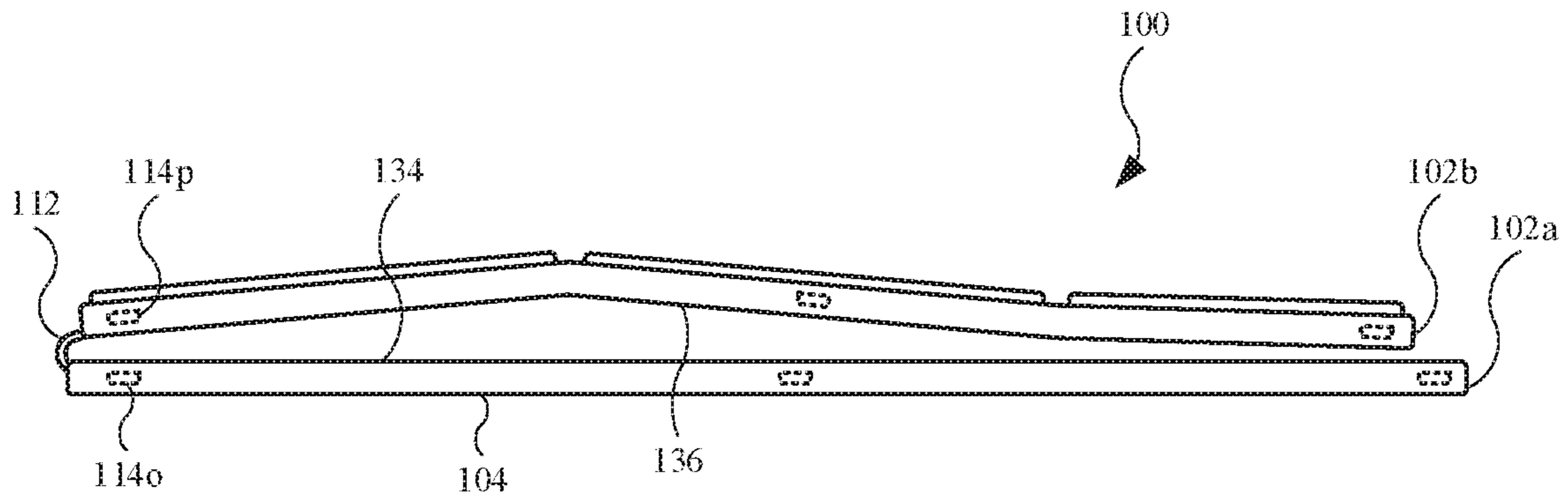


FIG. 4

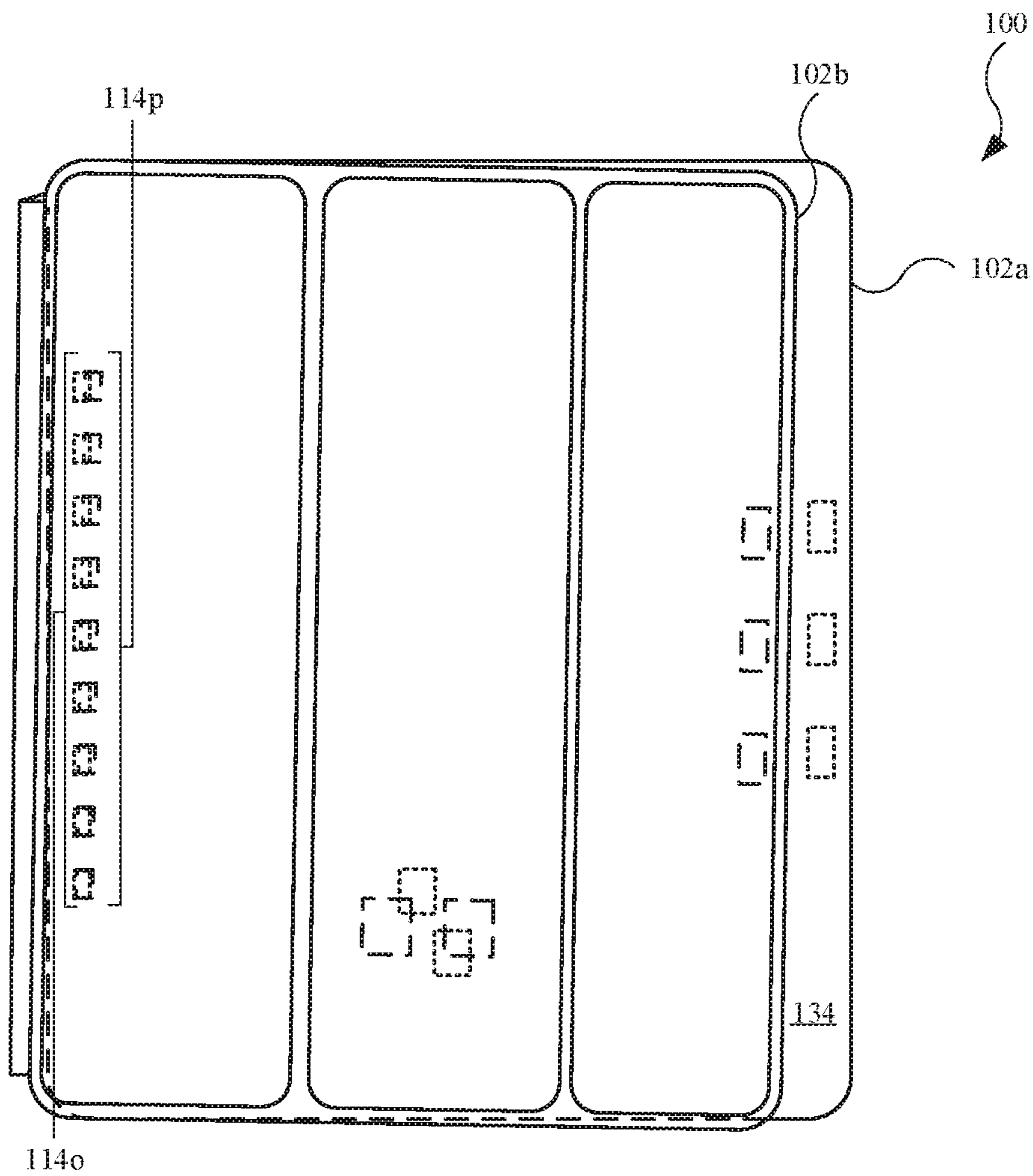


FIG. 5

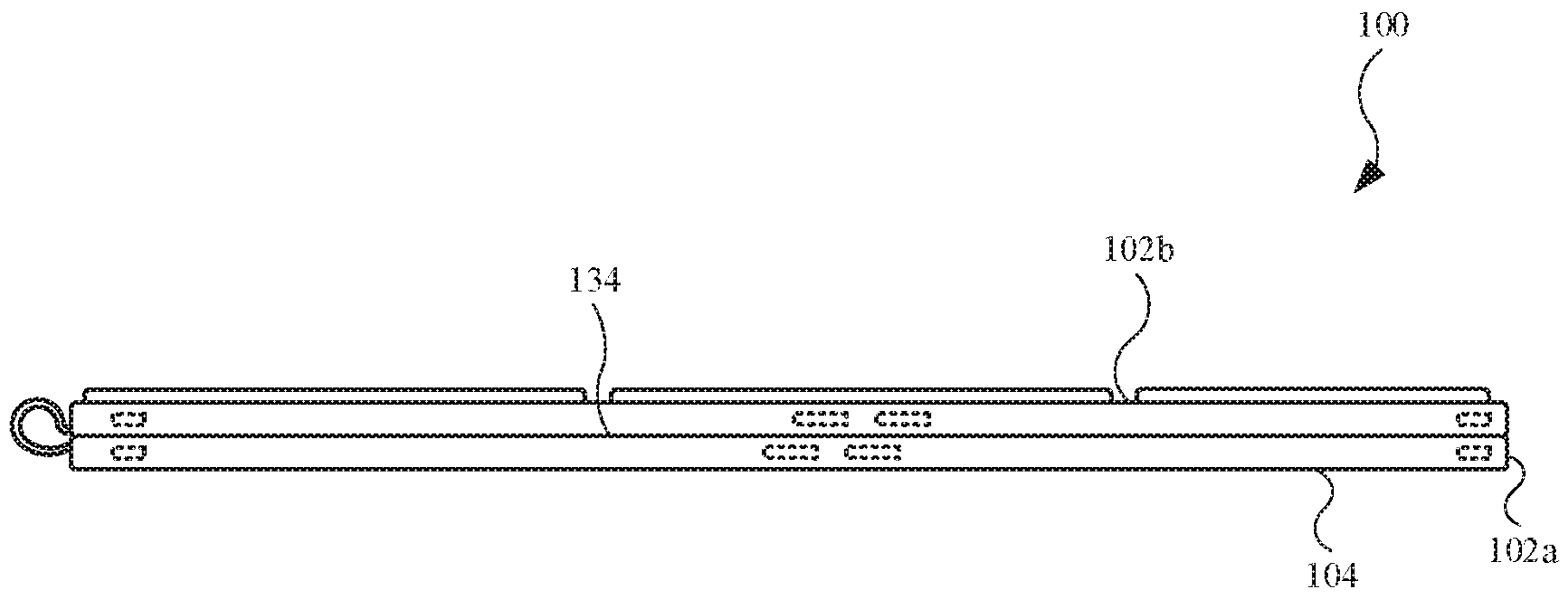


FIG. 6

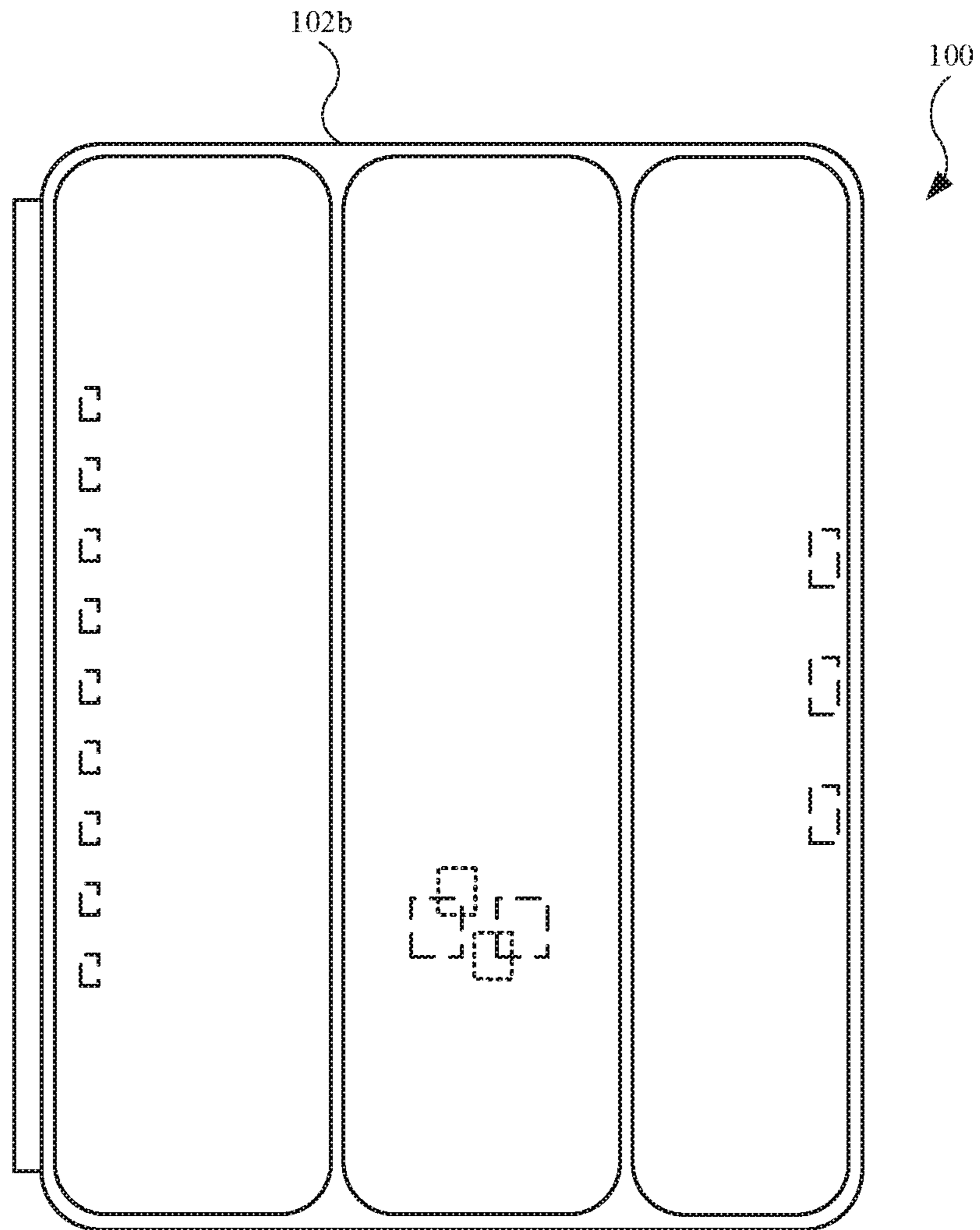


FIG. 7

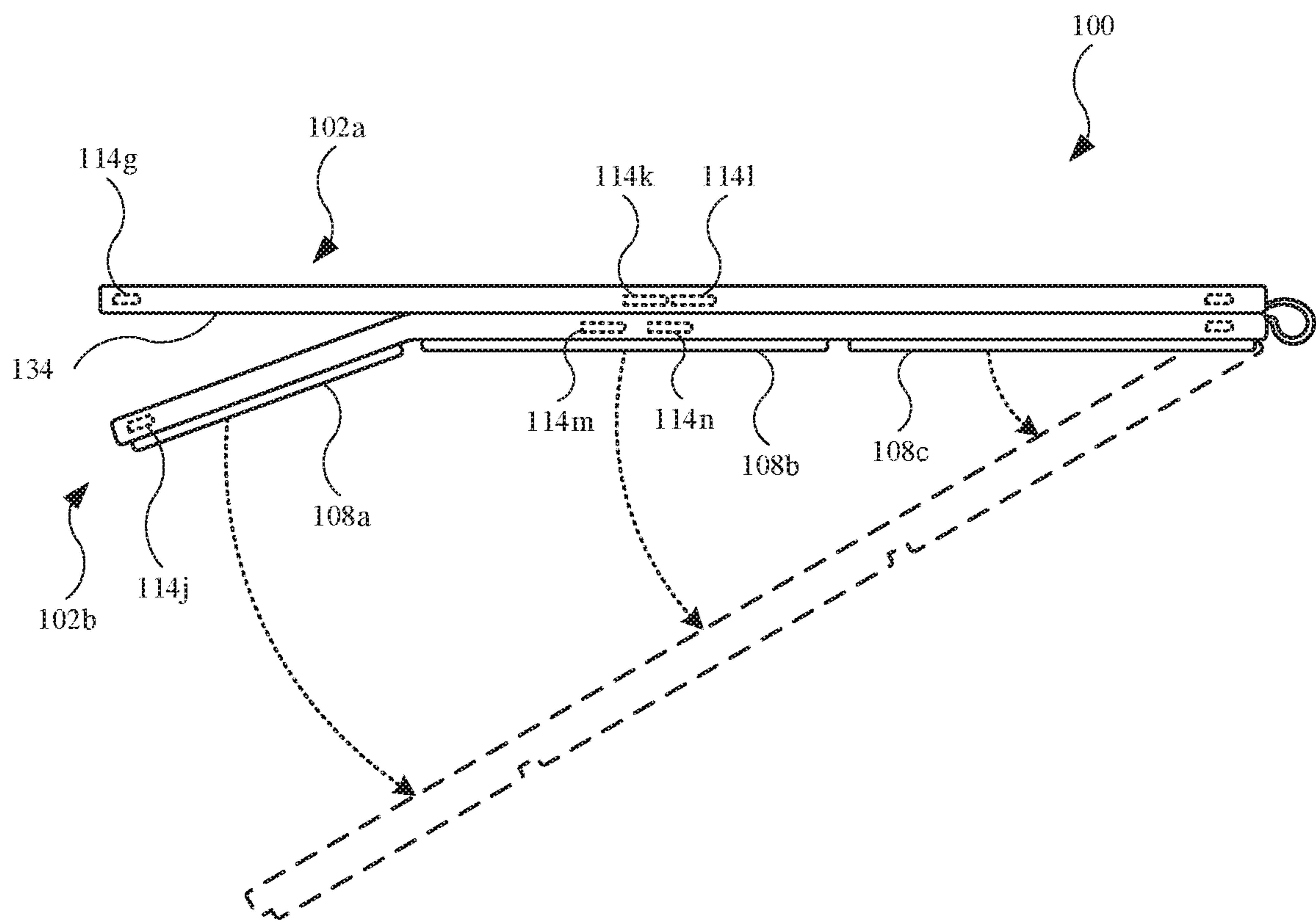


FIG. 8

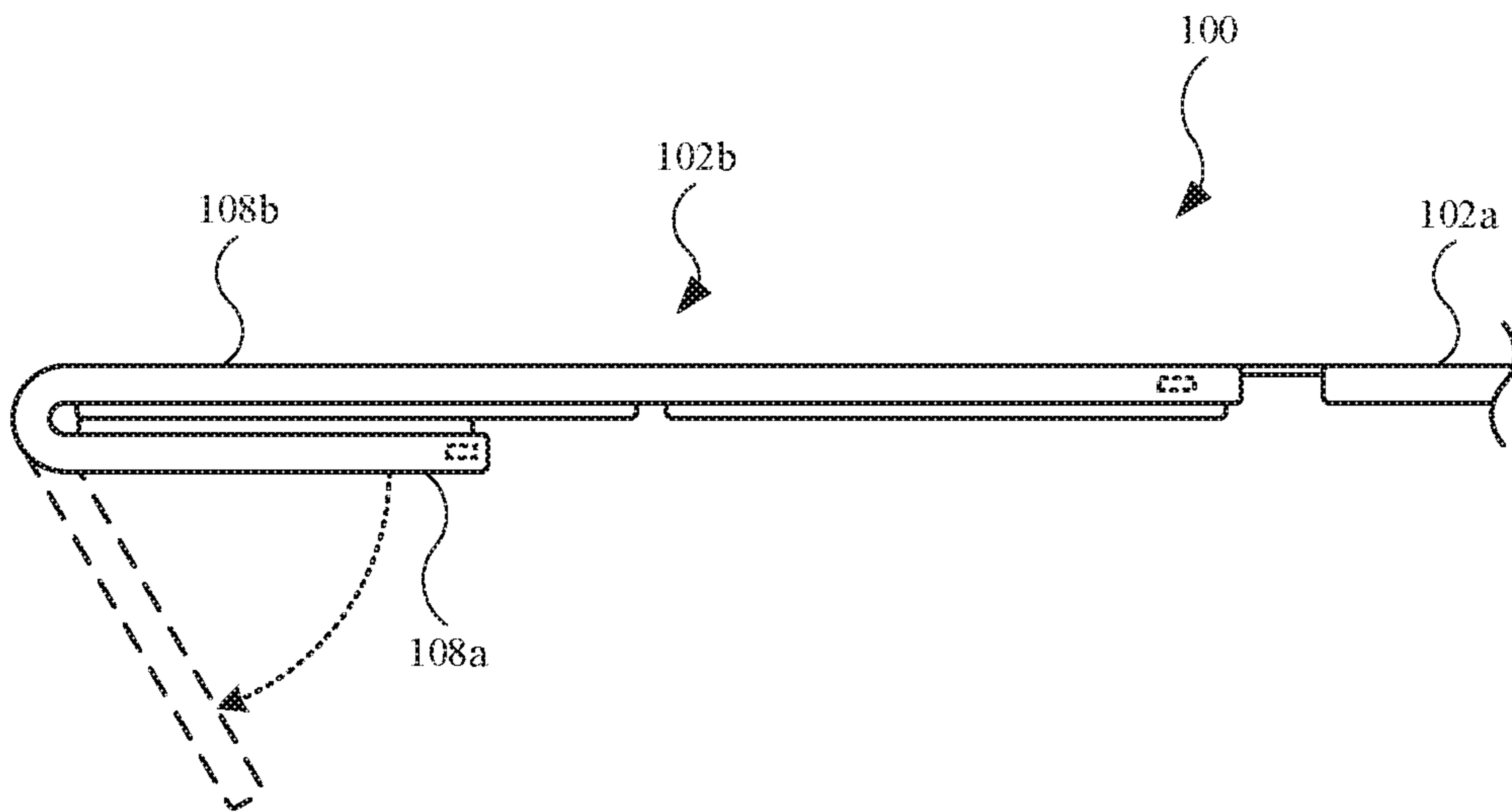


FIG. 9

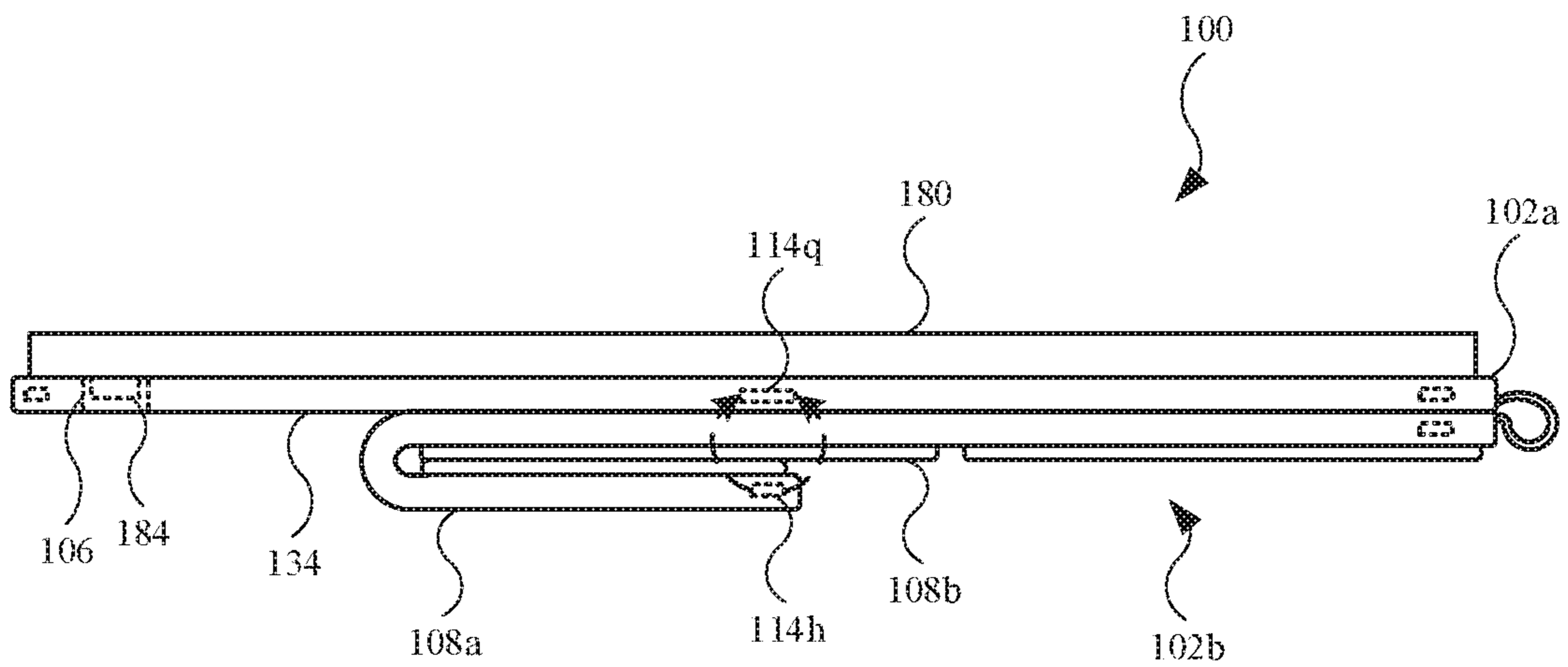


FIG. 10

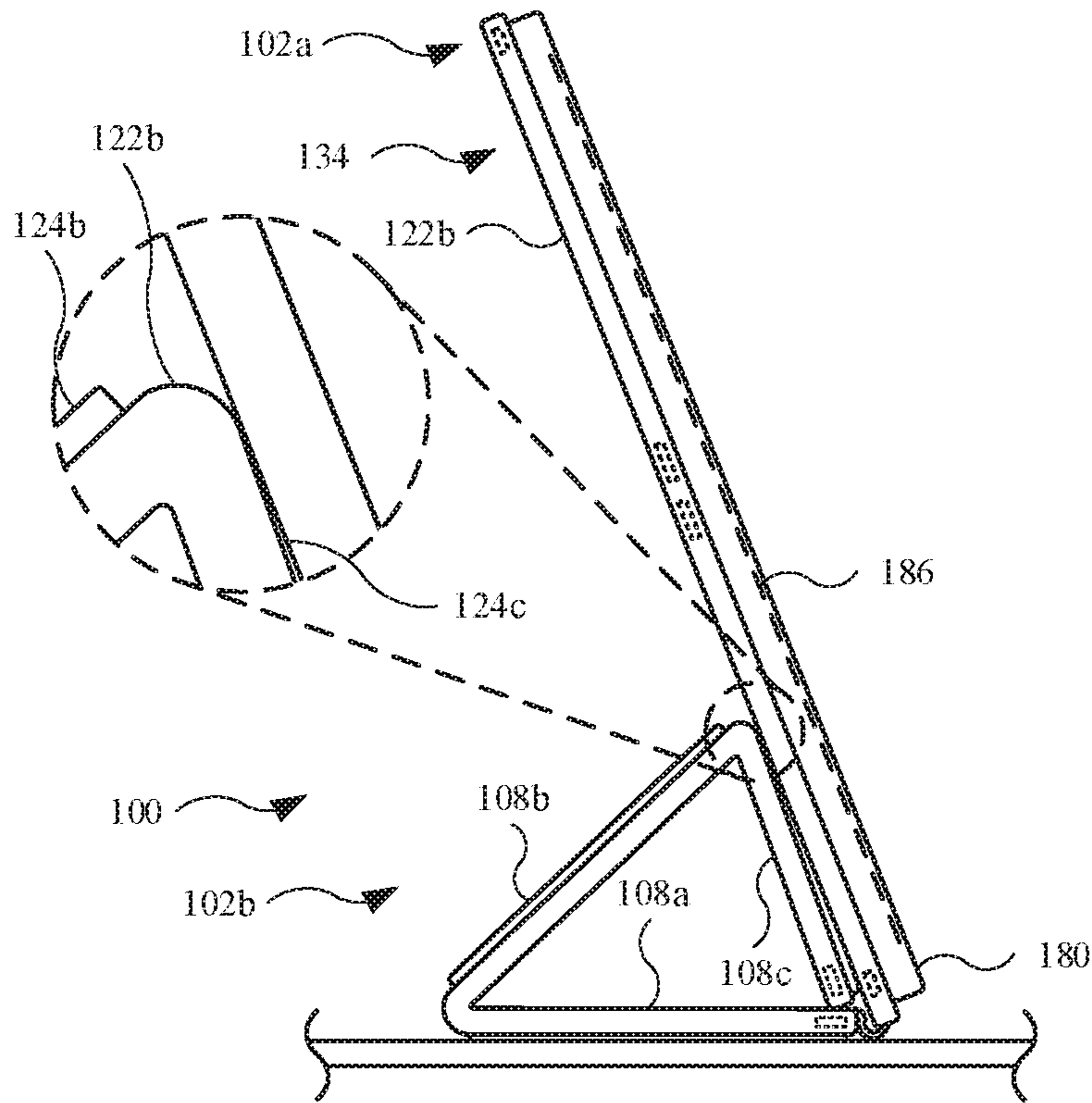


FIG. 11

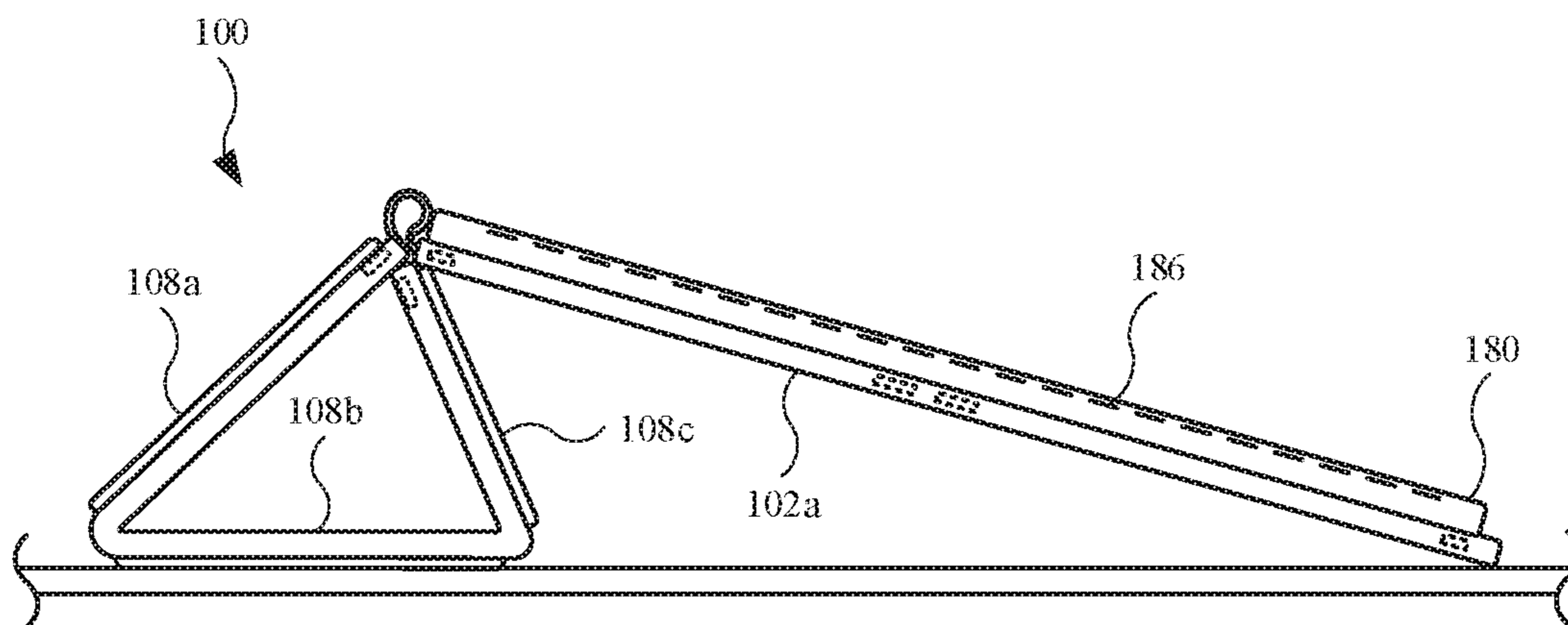


FIG. 12

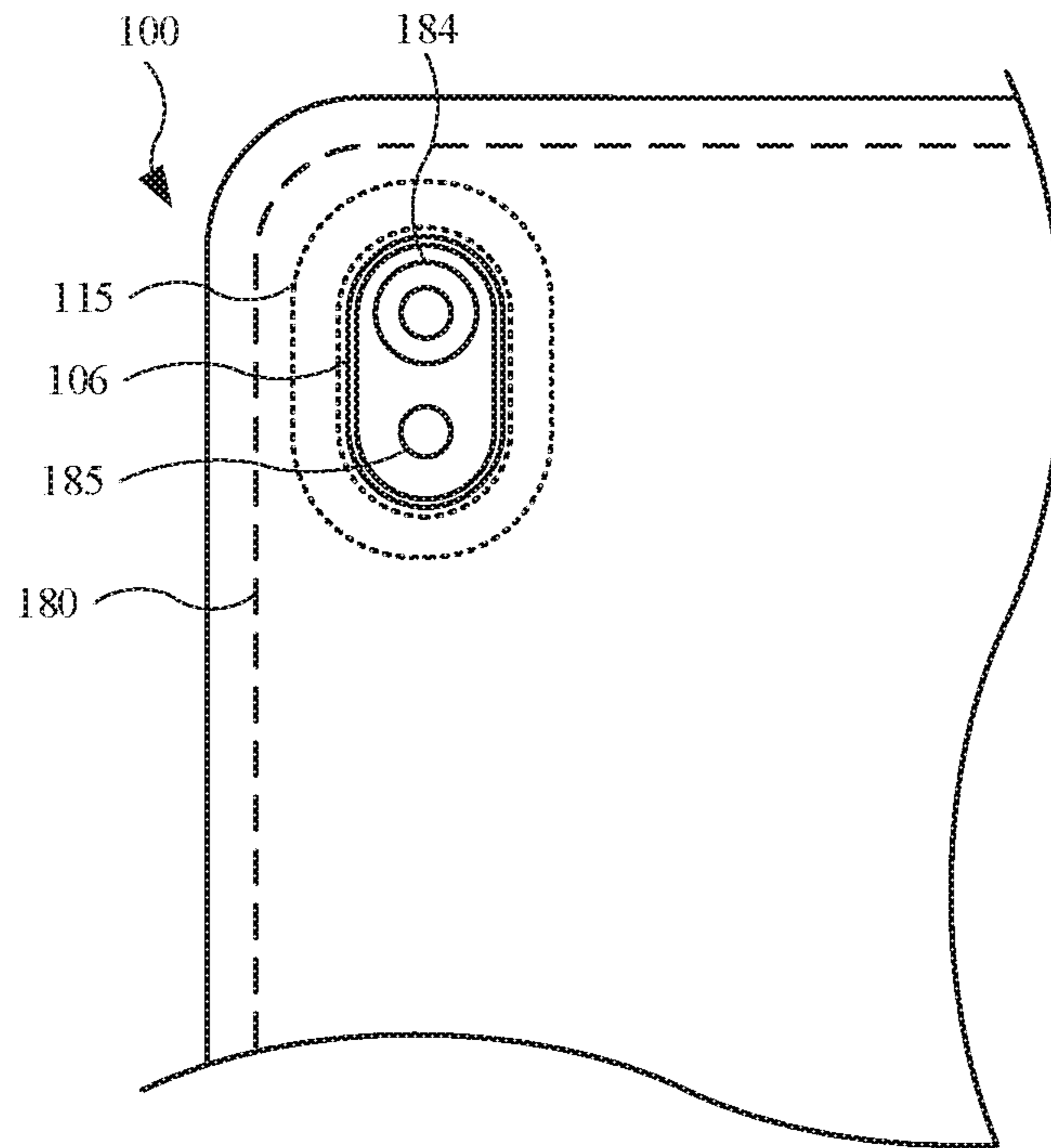


FIG. 13

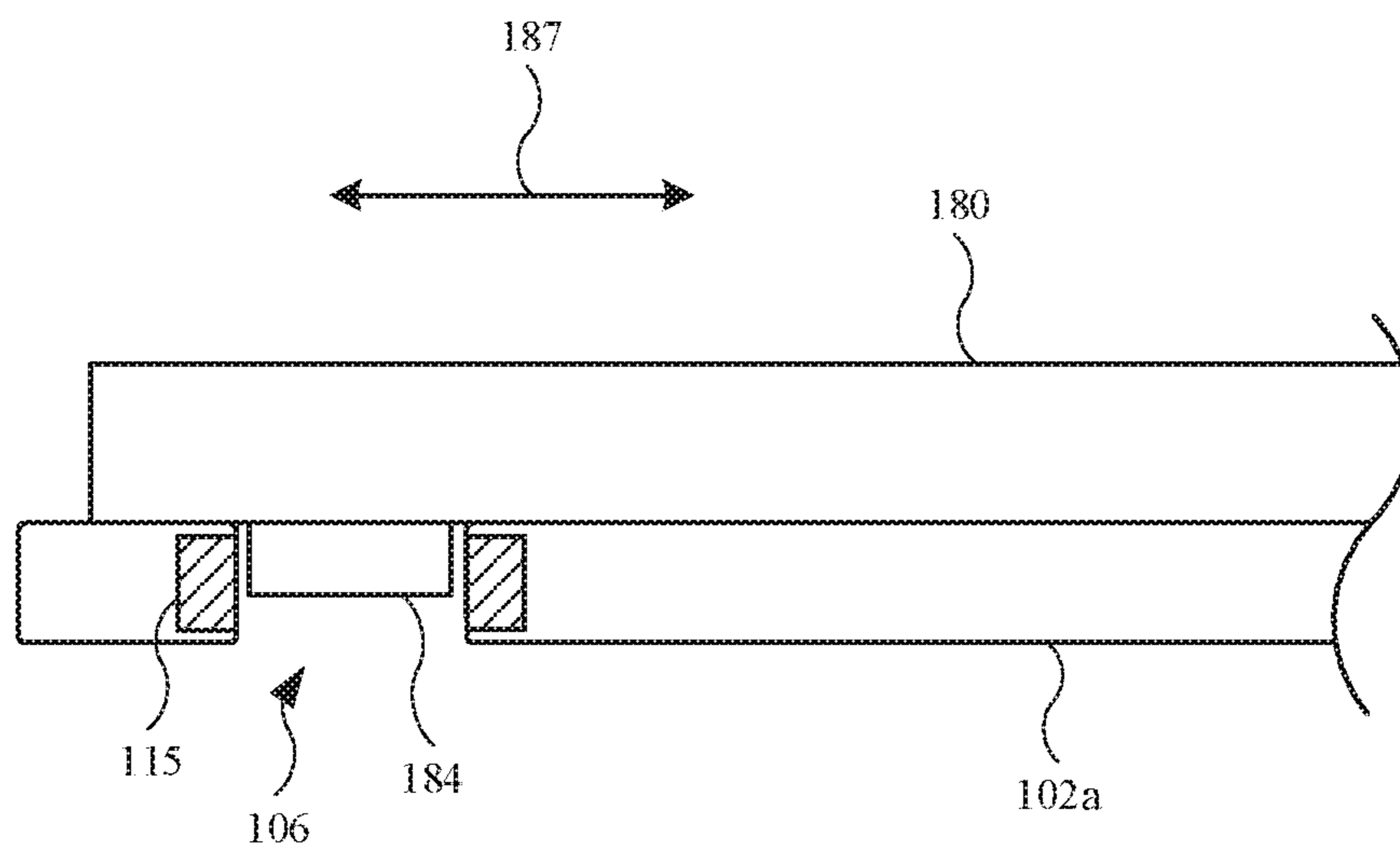


FIG. 14

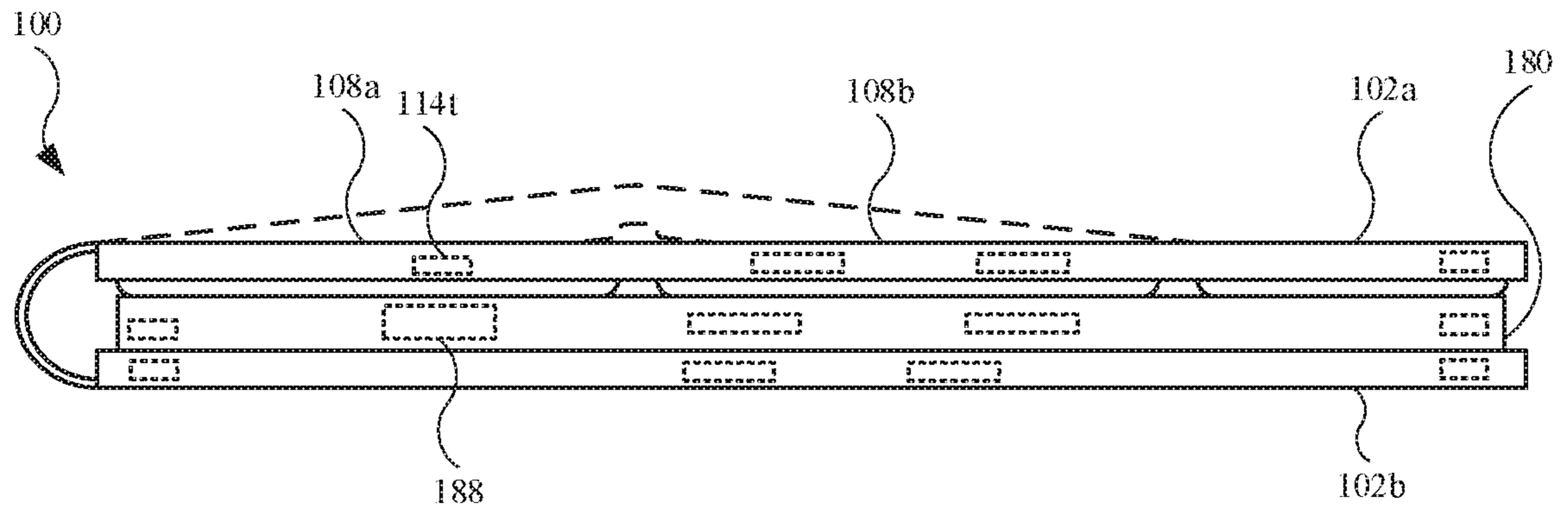


FIG. 15

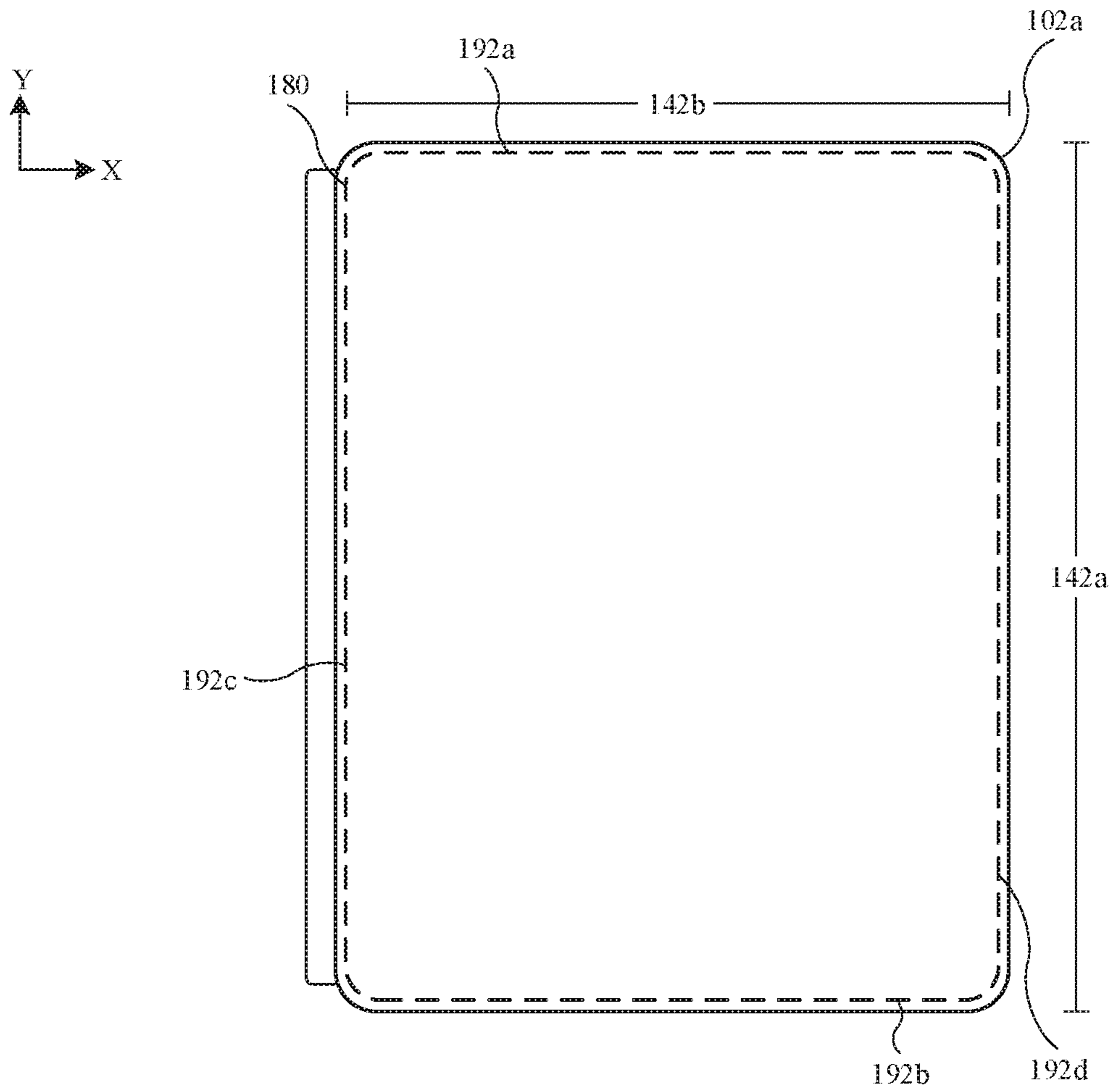


FIG. 16

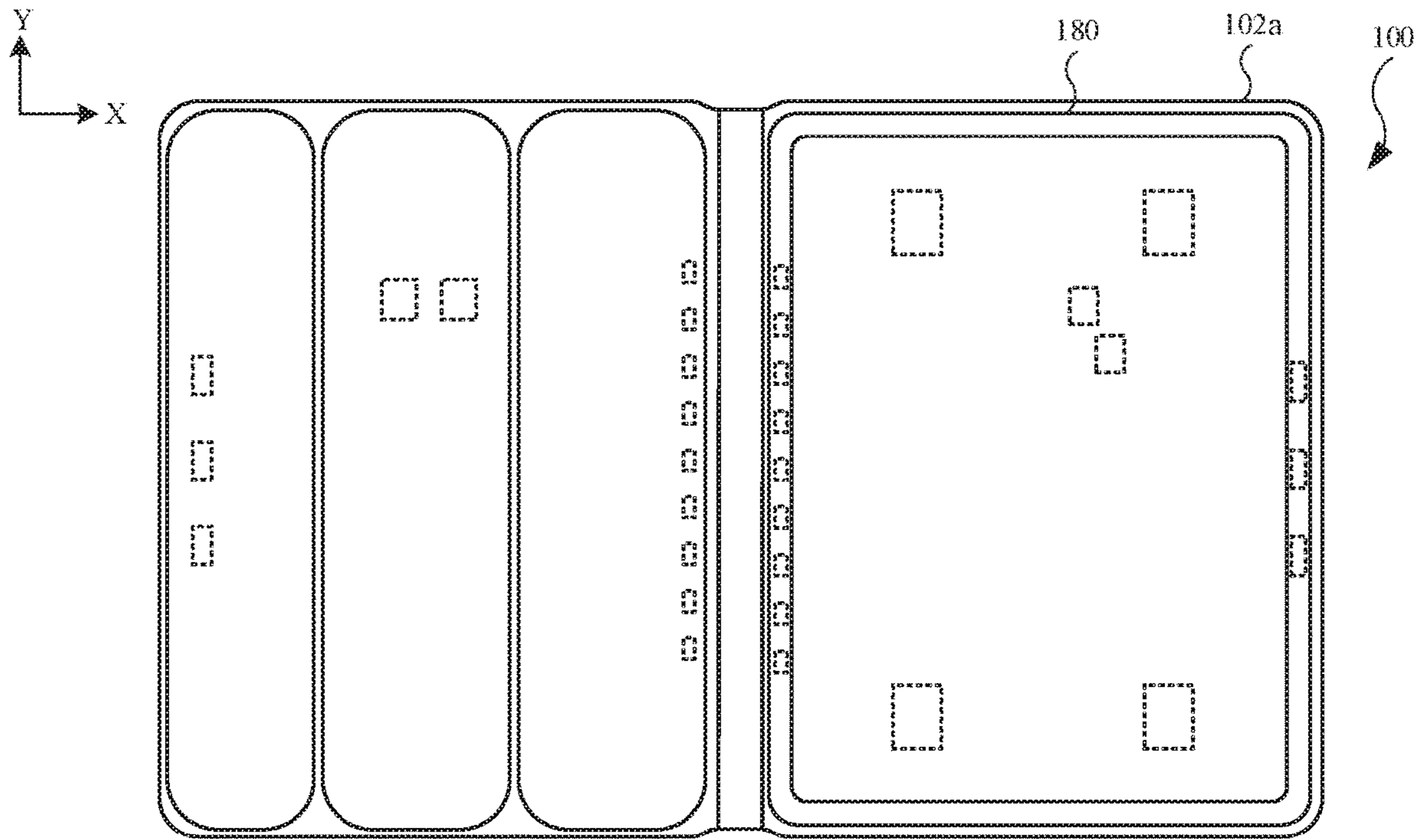


FIG. 17

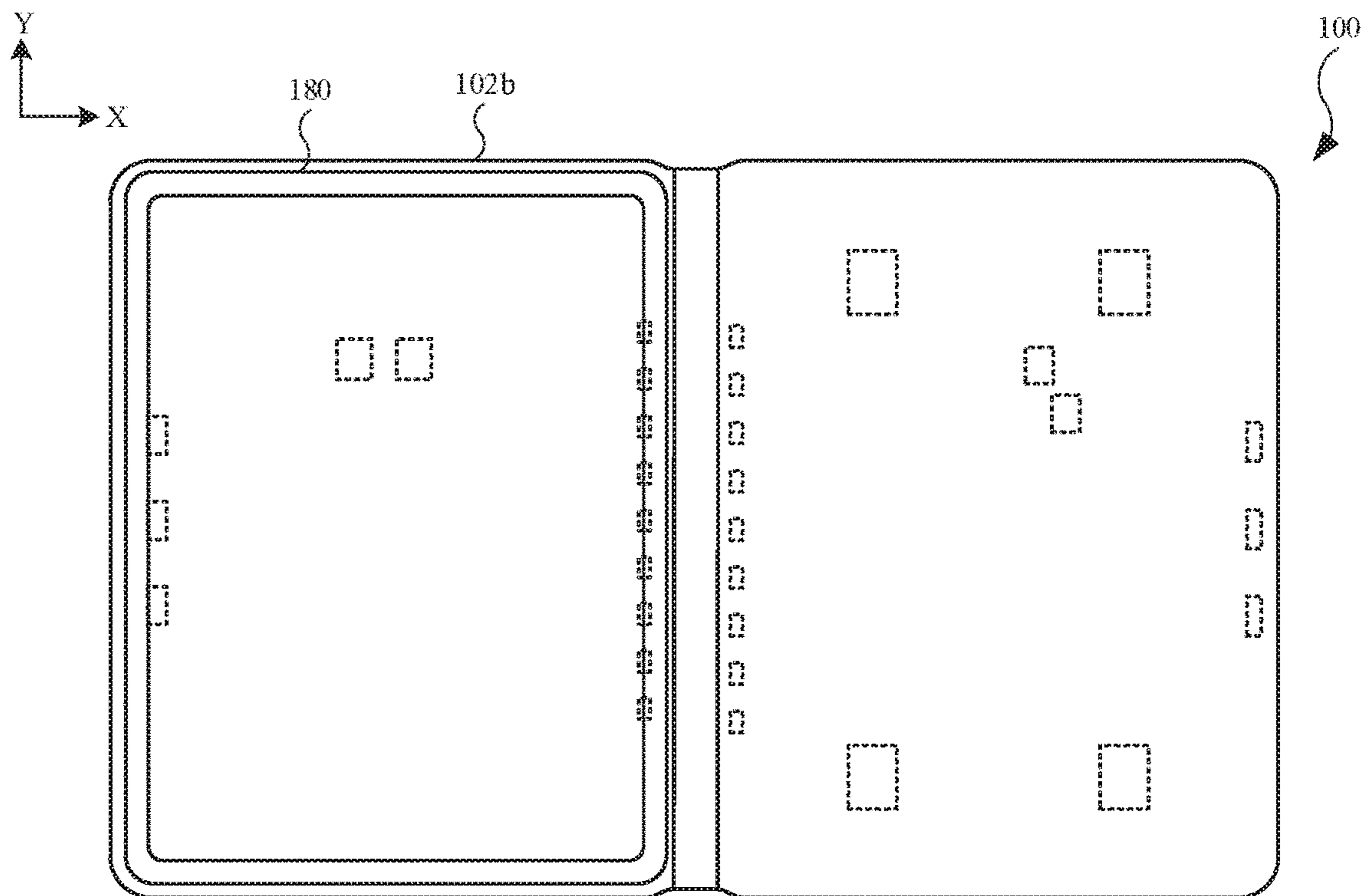


FIG. 18

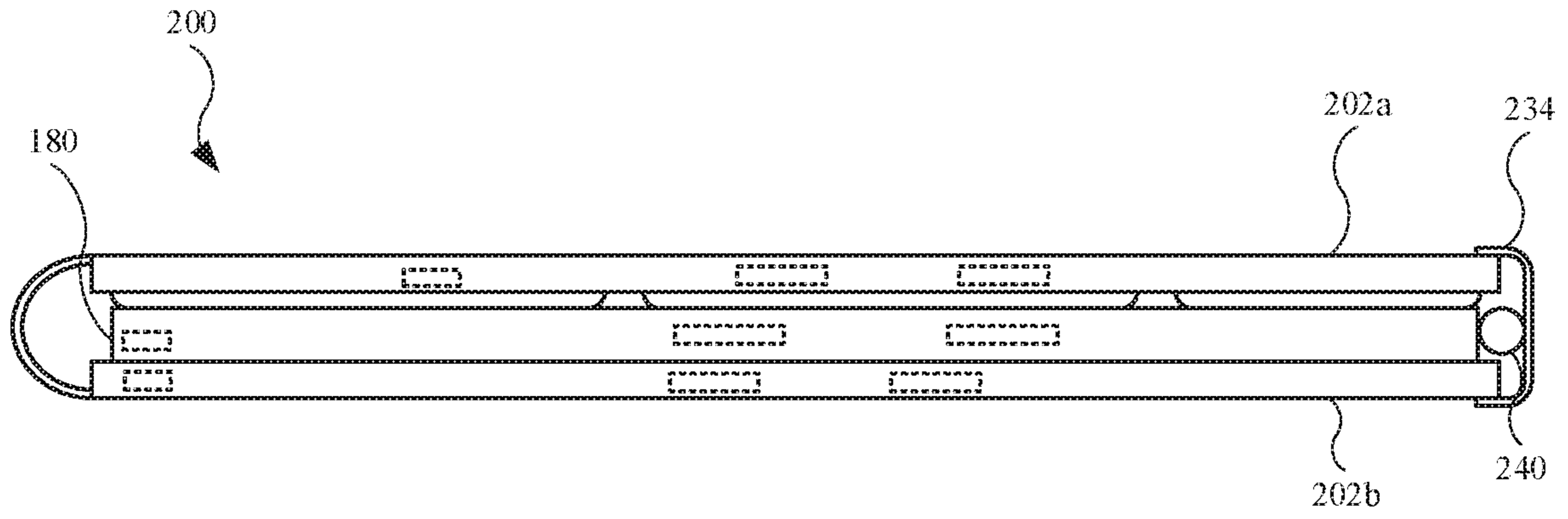


FIG. 19

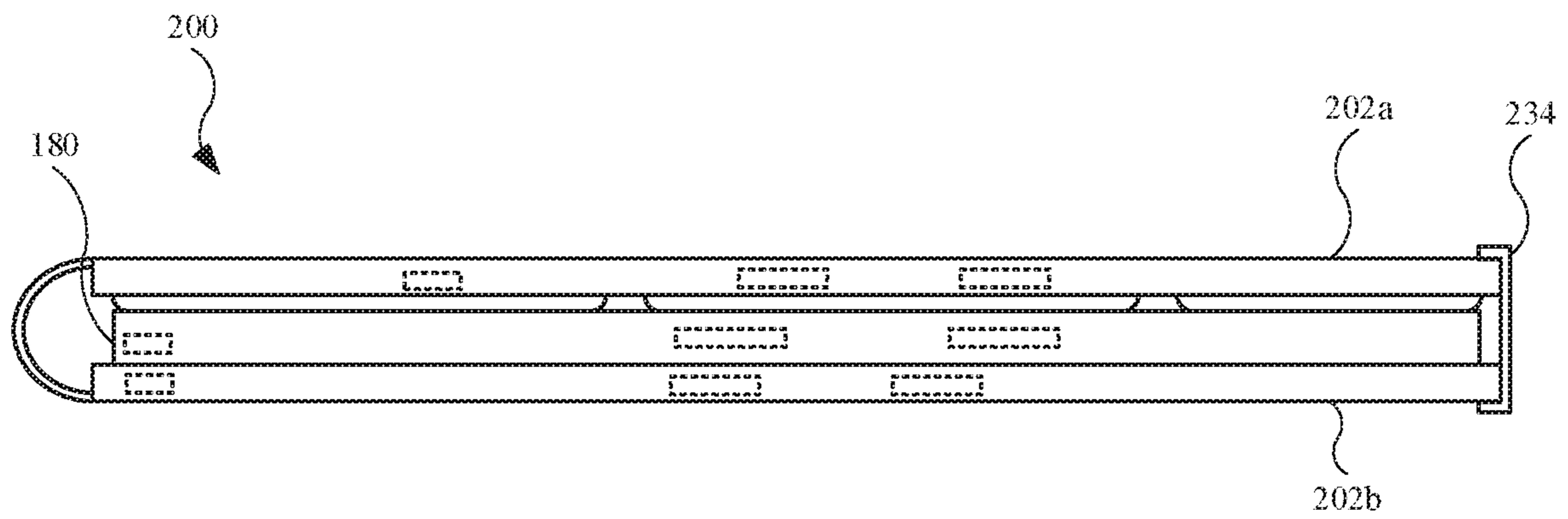


FIG. 20

1**ACCESSORY COVER FOR A PORTABLE
ELECTRONIC DEVICE****CROSS-REFERENCE TO RELATED
APPLICATION(S)**

This application claims the benefit of priority to U.S. Provisional Application No. 62/728,524, filed on Sep. 7, 2018, titled "ACCESSORY COVER FOR A PORTABLE ELECTRONIC DEVICE," the disclosures of which are incorporated herein by reference in their entirety.

FIELD

The following description relates to accessory devices. In particular, the following description relates to accessory cases and covers that can be used with portable electronic devices. Accessory cases, accessory covers, or accessory devices described herein may include covers, folios, protective covers, protective devices, or the like.

BACKGROUND

Accessory devices are designed to provide a protective cover for electronic devices. An accessory device can protect the housing, the display, and/or the transparent cover of the electronic device.

SUMMARY

In one aspect, an accessory device for a portable electronic device is described. The accessory device may include a first section that defines a receiving surface for the portable electronic device. The first section may include a back surface opposite the receiving surface. The accessory device may further include a second section coupled with the first section and capable of covering the portable electronic device. The second section may include a first segment and a second segment. In some instances, a removal of the first segment from the back surface initiates an automatic removal of the second segment from the back surface second segment.

In another aspect, an accessory device for a portable electronic device is described. The accessory device may include a first section that defines a receiving surface for the portable electronic device. The accessory device may further include a second section coupled with the first section and capable of covering the portable electronic device. In some instances, when the portable electronic device is positioned on the receiving surface and the second section covers the portable electronic device, the first section and second section extend laterally beyond edges of the portable electronic device.

In another aspect, an accessory device for a portable electronic device is described. The accessory device may include a first section that defines a receiving surface for the portable electronic device. The first section further may include a back surface opposite the receiving surface. The accessory device may further include a first magnetic element embedded in the first section. The accessory device may further include a second section coupled with the first section and capable of covering the portable electronic device. The accessory device may further include a second magnetic element embedded in the second section. In some instances, a magnetic coupling between the first magnetic element and the second magnetic element causes the second section to align with the back surface.

2

Other systems, methods, features and advantages of the embodiments will be, or will become, apparent to one of ordinary skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description and this summary, be within the scope of the embodiments, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

FIG. 1 illustrates an isometric view of an embodiment of an accessory device, in accordance with some described embodiments;

FIG. 2 illustrates a plan view of the accessory device shown in FIG. 1, showing a layout of magnets in the accessory device;

FIG. 3 illustrates a cross sectional view of the accessory device shown in FIG. 2, taken across line 3-3, showing various features of the accessory device;

FIG. 4 illustrates a side view of the accessory device, showing the second section partially positioned over a back surface of the first section;

FIG. 5 illustrates a plan view of the accessory device shown in FIG. 4, showing the second section partially aligned with the first section;

FIG. 6 illustrates a side view of the accessory device, showing the second section positioned over, and engaged with, the back surface of the first section;

FIG. 7 illustrates a plan view of the accessory device shown in FIG. 6, showing the second section aligned with the first section;

FIG. 8 illustrates a side view of the accessory device, showing the first segment of the second section pulled away from the back surface of the first section;

FIG. 9 illustrates a side view of the accessory device, showing the first segment engaged with the second segment;

FIG. 10 illustrates a side view of the accessory device, showing the first section partially engaged with the second section, and the first segment rotated to engage the second segment;

FIG. 11 illustrates a side view of the accessory device supporting the electronic device;

FIG. 12 illustrates a side view of the accessory device supporting the electronic device in an alternate configuration;

FIG. 13 illustrates a plan view of the accessory device, showing the camera assembly and the flash module of the electronic device positioned in the opening of the accessory device;

FIG. 14 illustrates a side view of the accessory device and the electronic device shown in FIG. 13, showing the camera assembly protruding through the opening of the accessory device;

FIG. 15 illustrates a side view of the electronic device positioned between the first section and the second section of the accessory device, showing the first section and the second section extending beyond the electronic device;

FIG. 16 illustrates a plan view of the electronic device and the accessory device shown in FIG. 15, showing the first section extending beyond the electronic device in multiple dimensions;

3

FIG. 17 illustrates a side view of the accessory device and the electronic device, showing the electronic device engaged with the first section;

FIG. 18 illustrates a side view of the accessory device and the electronic device, showing the electronic device engaged with the second section;

FIG. 19 illustrates a side view of an alternate embodiment of an accessory device holding the electronic device, further showing an object coupled with an edge of the electronic device; and

FIG. 20 illustrates a side view of the accessory device and the electronic device shown in FIG. 19, with the object removed.

Those skilled in the art will appreciate and understand that, according to common practice, various features of the drawings discussed below are not necessarily drawn to scale, and that dimensions of various features and elements of the drawings may be expanded or reduced to more clearly illustrate the embodiments of the present invention described herein.

DETAILED DESCRIPTION

Reference will now be made in detail to representative embodiments illustrated in the accompanying drawings. It should be understood that the following descriptions are not intended to limit the embodiments to one preferred embodiment. To the contrary, it is intended to cover alternatives, modifications, and equivalents as can be included within the spirit and scope of the described embodiments as defined by the appended claims.

In the following detailed description, references are made to the accompanying drawings, which form a part of the description and in which are shown, by way of illustration, specific embodiments in accordance with the described embodiments. Although these embodiments are described in sufficient detail to enable one skilled in the art to practice the described embodiments, it is understood that these examples are not limiting such that other embodiments may be used, and changes may be made without departing from the spirit and scope of the described embodiments.

The following disclosure relates to accessory devices for use with portable electronic devices, such as mobile wireless communication devices and tablet computer devices. Accessory devices described herein may be referred to as covers, cases, protective covers, protective cases, or folios, as non-limiting examples. Accessory devices are designed to house and protect portable electronic devices. In this regard, accessory devices herein may cover both the transparent cover (or cover glass) positioned over the display assembly of the portable electronic device as well as the housing of the electronic device. As a result, an accessory device described herein may provide protection against damage to a portable electronic device.

An accessory device may include a back cover (also referred to as a first section or back panel) attached to a front cover (also referred to as a second section or front panel) by a hinge. The front cover can cover the transparent cover of the portable electronic device, while the back cover can at least partially cover the housing of the electronic device. The front cover may include multiple segments that are rotatable with respect to each other. At least some of the segments may include magnets that allow the segments to couple, or secure, with each other (through magnetic coupling) as well as with the portable electronic device (through magnetic coupling with magnets in the portable electronic device).

4

Further, when the segments couple with each other, the front cover may fold and form a support, or stand, for the portable electronic device.

The back cover may provide a receiving surface for the electronic device. Also, the back cover may include several magnets designed to magnetically couple with magnets in the portable electronic device. Further, at least some magnets in the front cover may magnetically couple with magnets in the back cover. This allows for a configuration of the accessory device in which the front cover is stored behind the back cover. As a result, the accessory device provides a compact design with a reduced footprint. Also, prior to the front cover lying flat against the back cover (and while an air pocket separates the front cover from the back cover), some magnets in the front cover may magnetically couple with magnets in the back cover. In this manner, the magnetic coupling may provide a force that shifts, or moves, the front cover and aligns the front cover with the back cover. This allows the hinge that couples the front cover to the back cover to provide additional flexibility, as the magnetic coupling can align the front and back covers with each other.

These and other embodiments are discussed below with reference to FIGS. 1-20. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these Figures is for explanatory purposes only and should not be construed as limiting.

FIG. 1 illustrates an isometric view of an embodiment of an accessory device 100, in accordance with some described embodiments. The accessory device 100 is designed for use with an electronic device 180, including portable electronic devices such as mobile wireless communication devices and tablet computer devices. In this regard, the accessory device 100 may be referred to as a case, a cover, a protective cover, a protective case, a folio, or the like.

As shown, the accessory device 100 may include a first section 102a coupled to a second section 102b. The first section 102a may define a back cover or back panel for the electronic device 180. Also, the first section 102a may define a receiving surface 104 that receives the electronic device 180, and in particular, a housing 182 of the electronic device 180. In this regard, the first section 102a may retain the electronic device 180 with one or more magnets embedded in the first section 102a. This will be shown and discussed below. The first section 102a may further include an opening 106, or through hole, designed to receive a camera assembly 184 and a flash module 185 (both shown as dotted lines) of the electronic device 180.

The second section 102b is designed to wrap around and cover the electronic device 180, including a display 186 of the electronic device 180. In this manner, the second section 102b may be referred to as a front panel or front cover. The second section 102b may include multiple segments. For example, the second section 102b may include a first segment 108a, a second segment 108b, and a third segment 108c. Each segment is rotatable or moveable with respect to the remaining segments. Also, while a discrete number of segments are shown, the number of segments may vary in other embodiments.

The second section 102b is coupled to the first section 102a by a hinge 112 such that the first section 102a is rotatable with respect to the second section 102b, and vice versa. The hinge 112 may be formed in part by one more continuous pieces of material that extend along the first section 102a and the second section 102b. The materials that form the layer(s) may include polymers, such as polyurethane, that wrap around a fiberglass material. Other materials, such as leather, are possible. However, in order to

promote flexibility and relative movement of the aforementioned sections and segments, the fiberglass material (and/or other relatively rigid or stiff materials) may not be located at the hinge **112** and may not be located between the segments. This will be shown and described below. Also, a soft, non-abrasive material, such as microfiber, may cover the first segment **108a**, the second segment **108b**, and the third segment **108c**. In this manner, when the second section **102b** wraps around and covers the display **186** (which may include transparent cover overlaying the display **186**), the soft, non-abrasive material does not cause damage when in contact with the transparent cover.

FIG. 2 illustrates a plan view of the accessory device **100** shown in FIG. 1, showing a layout of magnets in the accessory device **100**. The magnets (or magnetic elements) described herein may include permanent magnets, ferromagnetic materials, rear Earth magnets, or other magnetically attractable materials. As shown, the accessory device **100** may include magnetic elements **114a**, magnetic elements **114b**, magnetic elements **114c**, and magnetic elements **114d** located in the first section **102a**. The magnetic elements **114a**, the magnetic elements **114b**, the magnetic elements **114c**, and the magnetic elements **114d** are designed to magnetically couple with magnets in the electronic device **180** (shown in FIG. 1) to retain the electronic device **180** with the receiving surface **104**. As a result, the accessory device **100** does not require mechanical features (such as retaining walls, sidewalls, or mechanical interlocks) to retain the electronic device **180**. Furthermore, the magnetic elements in the accessory device **100** that magnetically couple with magnets in the electronic device **180** provide a magnetic attraction force capable of holding the electronic device **180** even when forces, such as gravitational force, are acting on the electronic device **180** that would otherwise cause the electronic device **180** to detach from the accessory device **100**.

Some magnetic elements (shown as dotted lines) shown and described in FIG. 2 may include several discrete magnetic elements. For example, as shown in the enlarged view, the magnetic elements **114a** includes six discrete magnetic elements. The number of magnetic elements may vary in other embodiments. By using several, smaller discrete magnetic elements, as opposed to using fewer, but larger magnetic elements, the ease of aligning the electronic device **180** (shown in FIG. 1) with the first section **102a** increases. For example, each magnetic element provides a relatively small external magnetic field (not shown in FIG. 2), thereby reducing the magnetic attraction force per magnetic element during the alignment. However, the magnetic elements, as a group (such as the cluster of the magnetic elements **114a**), may provide a similar collective external magnetic field as that of a single, larger magnetic element. As a result, the magnetic attraction force of the group of magnetic elements is similar to that of a single, larger magnetic element, while the ease of alignment is increased, as compared to the use of the single, larger magnetic element.

The accessory device **100** may further include magnetic elements **114e**, magnetic elements **114f**, and magnetic elements **114g** in the first section **102a** that are designed to magnetically couple with magnetic elements **114h**, magnetic elements **114i**, and magnetic elements **114j**, respectively, in the second section **102b**. These magnetic couplings may occur when, for example, a back surface (not shown in FIG. 2) of the second section **102b** is rotated over and onto a back surface (not shown in FIG. 2) of the first section **102a** via the hinge **112**, with the back surface of the first section **102a** being opposite the receiving surface **104**. Also, these mag-

netic couplings may occur when the second section **102b** is rotated over and onto the receiving surface **104**.

The accessory device **100** may further include magnetic elements **114k** and magnetic elements **114l** located in the first section **102a** that are designed to magnetically couple with magnetic elements **114m** and magnetic elements **114n**, respectively, located in the second section **102b**, and in particular, the second segment **108b**. The magnetic elements **114m** and the magnetic elements **114n** are parallel (or aligned) with each other, while the magnetic elements **114k** are offset (or misaligned) with respect to the magnetic elements **114l**. Also, when the aforementioned back surfaces of the first section **102a** and the second section **102b** are engaged with each other, the magnetic elements **114k** and the magnetic elements **114l** are offset with respect to the magnetic elements **114m** and the magnetic elements **114n**, respectively. However, the degree of offset between the magnetic elements **114k** and the magnetic elements **114m** may differ from that of the magnetic elements **114l** and the magnetic elements **114n**. In this manner, when the back surface of the second section **102b** is positioned against the back surface of the first section **102a**, the magnetic attraction between the magnetic elements **114k** and the magnetic elements **114m** may differ from the magnetic attraction between the magnetic elements **114k** and the magnetic elements **114l**. For example, the magnetic attraction between the magnetic elements **114k** and the magnetic elements **114m** may be greater than the magnetic attraction between the magnetic elements **114k** and the magnetic elements **114l**. As a result, when the magnetic elements **114k** are no longer coupled to the magnetic elements **114m**, the magnetic elements **114l** are no longer coupled to the magnetic elements **114n**. This may be part of a comprehensive process in which a removal of the first segment **108a** from the back surface of the first section **102a** initiates a subsequent removal the second segment **108b** and the third segment **108c** from the back surface of the first section **102a** without any additional force required other than the force required to pull the first segment **108a** away from the back surface of the first section **102a**. In other words, when the first segment **108a** is removed from the back surface, the second segment **108b** and the third segment **108c** may automatically fall away from the back surface of the first section **102a**. This will be shown and described later.

The accessory device **100** may further include magnetic elements **114o** located in the first section **102a** that are designed to magnetically couple with magnetic elements **114p** located in the second section **102b**, and in particular, the third segment **108c**. When the second section **102b** is positioned against the back surface of the first section **102a**, the magnetic elements **114o** magnetically couple with magnetic elements **114p**. Further, while the second section **102b** is rotated over and onto the back surface of the first section **102a**, the magnetic elements **114p** magnetically couple with the that magnetic elements **114o** prior to the second section **102b** fully lying on the back surface of the first section **102a**. The magnetic coupling can provide a magnetic attraction force that pulls the second section **102b** in a manner that aligns the second section **102b** with the back surface to prevent misalignment between the second section **102b** and the first section **102a**. In other words, the second section **102b** will not be crooked with respect to the first section **102a** as a result of the magnetic coupling between the magnetic elements **114o** and the magnetic elements **114p**. This will be further detailed below.

Also, the accessory device **100** may include a reinforcement layer **115** positioned in the first section **102a** around the

opening 106. The reinforcement layer 115 may provide additional rigidity to a void or space that defines the opening 106. This may prevent the first section 102a from breaking along the corner in which the reinforcement layer 115 is located. In some embodiments, the reinforcement layer 115 includes a glass fiber material having a relatively high density. However, other materials (such as metals, rigid plastics, as non-limiting examples) are possible. Further, the first section 102a, and in particular, the receiving surface 104, is generally planar. However, in some instances, the first section 102a may include a localized thickness in a location corresponding to the opening 106, due in part to a thicker reinforcement layer, as compared to the reinforcement layer 115 shown in FIG. 2.

The accessory device 100 may include certain dimensional characteristics. For example, the hinge 112 may include a dimension 116a that the same as, or at least substantially similar to, a major dimension of the electronic device 180. The “major dimension” may refer to a dimension of greatest length of the electronic device 180. Also, the dimensions of some of the segments may differ. For example, the first segment 108a may include a dimension 118a that is less than a dimension 118b of the second segment 108b and less than a dimension 118c of the third segment 108c. Further, the dimension 118b of the second segment 108b can be the same as, or at least substantially similar, to the dimension 118c of the third segment 108c. However, other dimensional relationships of the first segment 108a, the second segment 108b, and/or the third segment 108c are possible.

Additionally, the accessory device 100 may include magnetic elements 114q, magnetic elements 114r, and magnetic elements 114s embedded in the first section 102a. In some instances, when the first segment 108a is engaged with the second segment 108b, the magnetic elements 114h, the magnetic elements 114i, and the magnetic elements 114j can magnetically couple with the magnetic elements 114q, the magnetic elements 114r, and the magnetic elements 114s, respectively. This will be shown below.

FIG. 3 illustrates a cross sectional view of the accessory device 100 shown in FIG. 2, taken across line 3-3, showing various features of the accessory device 100. The accessory device 100 may include a first layer 122a and a second layer 122b. The first layer 122a and the second layer 122b may include a polymer layer that extends across both the first section 102a and the second section 102b (shown in FIGS. 1 and 2). Alternatively, each of the first layer 122a and the second layer 122b may include other materials, such as leather. In this regard, the first layer 122a and the second layer 122b may define the hinge 112 (shown in FIGS. 1 and 2). The accessory device 100 may further include a third layer 122c that is surrounded by the first layer 122a and the second layer 122b. The third layer 122c may include a relatively rigid material, such as fiberglass (as a non-limiting example). The third layer 122c may fill each of the segments. For example, as shown, the third layer 122c fills the first segment 108a. However, the third layer 122c may be confined to the first segment 108a to promote flexibility of the second section 102b (shown in FIGS. 1 and 2) and relative movement among the segments. Also, although not shown, the first layer 122a and the second layer 122b may terminate along the second section 102b and additional layers (similar to that of the first layer 122a and the second layer 122b) may form the first section 102a. In this regard, the hinge 112 (shown in FIGS. 1 and 2) may be formed from a material other than the first layer 122a and the second layer 122b.

The accessory device 100 may further include a layer on each of the segments. For example, the first segment 108a includes a layer 124a. The layer 124a may include a fabric layer, including microfiber. Generally, the layer 124a may include a material that prevents scratching of glass (or other transparent cover or transparent layer) of the electronic device 180 (shown in FIG. 1). In order to promote flexibility, the layer 124a may terminate at (or may be confined to) the first segment 108a. Further, the layer 124a can be applied to an uppermost (flat) surface of the first segment 108a, as well as a portion of the bends (along the first layer 122a) that surround the uppermost surface. In some instances, the layer 124a extends along a surface that is generally perpendicular to the uppermost surface. However, the layer 124a may terminate prior to reaching an additional surface that is parallel, or at least substantially parallel, to the uppermost surface. Generally, the layer 124a may extend between a first line 126a and a second line 126b, shown at each end of the first segment 108a. It should be noted that the second segment 108b and the third segment 108c (both shown in FIGS. 1 and 2) may include the same layers, including the same features and configurations of the layers, as shown for the first segment 108a. For example, a layer 124b (separate from the layer 124a) is positioned on the second segment 108b.

The accessory device 100 may further include a stiffening element 128 positioned between the first layer 122a and the second layer 122b. The stiffening element 128 may include glass fiber, a rigid plastic, or a metal, as non-limiting examples. The accessory device 100 may further include an adhesive 132a and an adhesive 132b that secure the first layer 122a with the second layer 122b.

FIG. 4 illustrates a side view of the accessory device 100, showing the second section 102b partially positioned over the back surface 134 of the first section 102a. It may be desirable to configure the accessory device 100 such that a back surface 136 of the second section 102b lies flat against the back surface 134 (opposite the receiving surface 104) of the first section 102a, as this configuration provides a more compact device.

Due in part to the hinge 112 having minimal, if any, stiffening elements and/or adhesives, the hinge 112 is relatively flexible but may allow misalignment of the second section 102b with respect to the first section 102a. For example, FIG. 5 illustrates a plan view of the accessory device 100 shown in FIG. 4, showing the second section 102b partially aligned with the first section 102a. As shown, the edges of the second section 102b are not aligned with the edges of the first section 102a. Without any other force(s) acting on the second section 102b, the second section 102b may be crooked when the second section 102b lies on the back surface 134. However, the magnetic elements 114o in the first section 102a can magnetically couple with the magnetic elements 114p in the second section 102b. The magnetic coupling provides a magnetic attraction force capable of pulling the magnetic elements 114p in the second section 102b toward the magnetic elements 114o in the first section 102a.

The pulling force caused by the magnet attraction between the aforementioned magnetic elements causes the second section 102b to align with the first section 102a in a more desired manner. For example, FIG. 6 illustrates a side view of the accessory device 100, showing the second section 102b positioned over, and engaged with, the back surface 134 of the first section 102a. The back surface of the second section 102b may lie on the back surface 134 of the first section 102a such that the back surface 134 of the first

section **102a** (including the edges) is covered by the second section **102b**. It should be noted that once the second section **102b** and the first section **102a** are aligned, the accessory device **100** may be rotated 180 degrees such that the second section **102b** is positioned on a surface (not shown), such as a desk or table. In this manner, the electronic device **180** (shown in FIG. 1) may be positioned on the receiving surface **104** of the first section **102a**.

FIG. 7 illustrates a plan view of the accessory device **100** shown in FIG. 6, showing the second section **102b** aligned with the first section **102a**. As shown, the second section **102b** is positioned over the back surface **134** of the first section **102a** (both labeled in FIG. 6). FIG. 7 represents an aligned configuration between the first section **102a** and the second section **102b**. In the aligned configuration, each corner of the first section **102a** covers a respective corner of the second section **102b** such that in the plan view (shown in FIG. 7) the first section **102a** covers the second section **102b**. Alternatively, the aligned configuration may also include each corner of the second section **102b** (not shown) covering a respective corner of the first section **102a** such that in an alternate plan view the second section **102b** covers the first section **102a**.

Referring again to FIGS. 4 and 5, as the second section **102b** is folded over the back surface **134** of the first section **102a**, the second section **102b** may momentarily lie on ambient air (such as an air blanket). This allows the magnetic elements **114o** in the first section **102a** to magnetically couple with the magnetic elements **114p** in the second section **102b** prior to the second section **102b** engaging the first section **102a**. However, in some instances, the second section **102b** may partially engage the first section **102a** prior to the magnetic coupling between the magnetic elements **114o** and the magnetic elements **114p**. Nonetheless, the magnetic attraction force between the magnetic elements **114o** and the magnetic elements **114p** is capable of aligning the second section **102b** with the first section **102a**, as shown in FIGS. 6 and 7.

FIG. 8 illustrates a side view of the accessory device **100**, showing the first segment **108a** of the second section **102b** pulled away from the back surface **134** of the first section **102a**. As shown, a pulling force can be applied to the second section **102b** that overcomes magnet attraction force formed by the magnetic coupling between the magnetic elements **114g** in the first section **102a** and the magnetic elements **114j** in the second section **102b**. The pulling force may also overcome the magnetic attraction force of magnetic elements **114e** and the magnetic elements **114j** (both shown in FIG. 2) with the magnetic elements **114h** and the magnetic elements **114i** (both shown in FIG. 2), respectively, and cease the magnetic coupling.

Once the first segment **108a** is pulled away from the back surface **134**, the second segment **108b** and the third segment **108c** may disengage the back surface **134**, as denoted by the dotted lines. Moreover, the second segment **108b** and the third segment **108c** may disengage the back surface **134** without any additional pulling force applied to the second section **102b**. In other words, the force that causes disengagement between the first segment **108a** and the back surface **134** is sufficient to initiate disengagement of the second segment **108b** and the third segment **108c** with the back surface **134**. As a result, once the magnetic elements in the first segment **108a** are no longer magnetically coupled with magnetic elements in the first section **102a** and the first segment **108a** is pulled away from the back surface **134** of the first section **102a**, a disengagement of the second segment **108b** and the third segment **108c** from the back surface

134 is initiated in a sequential manner. That is, the second segment **108b** disengages from the back surface **134**, followed by the third segment **108c** disengaging from the back surface **134**. This is due in part to the magnetic coupling and offset alignment between the magnetic elements **114k** and the magnetic elements **114l** in the first section **102a** with the magnetic elements **114m** and the magnetic elements **114n**, respectively, in the second section **102b**.

FIG. 9 illustrates a side view of the accessory device **100**, showing the first segment **108a** engaged with the second segment **108b**. Without any external force, the first segment **108a** will disengage and fall away from the second segment **108b** due to gravitational forces, as indicated by the dotted lines. Also, as shown, the first section **102a** is folded away from the second section **102b** such that the second section **102b** is not engaged with the first section **102a**.

FIG. 10 illustrates a side view of the accessory device **100**, showing the first section **102a** partially engaged with the second section **102b**, and the first segment **108a** rotated to engage the second segment **108b**. As shown, the magnetic elements **114h** in the first segment **108a** are magnetically coupled with the magnetic elements **114q** in the first section **102a**. The magnetic elements **114h** and the magnetic elements **114i** (both shown in FIG. 2) in the first segment **108a** may also magnetically couple with the magnetic elements **114r** and the magnetic elements **114s** (both shown in FIG. 2), respectively, in the first section **102a**. As a result, the first segment **108a** remains engaged with the second segment **108b** due in part to the magnetic coupling between magnetic elements in the first segment **108a** and magnetic elements in the first section **102a**. Moreover, the first segment **108a** no longer covers a portion of the back surface **134** such that the camera assembly **184** of the electronic device **180** can protrude through the opening **106** and capture images. FIGS. 9 and 10 illustrates that the first segment **108a** may not remain engaged with the second segment **108b** unless the first section **102a** engages the second section **102b** such that the magnetic elements in the first segment **108a** can magnetically couple with magnetic elements in the first section **102a**.

FIG. 11 illustrates a side view of the accessory device **100** supporting the electronic device **180**. In this configuration, a user of the electronic device **180** can interact with the display **186** (shown as a dotted line) of the electronic device **180** when the display **186** includes touchscreen capabilities. As shown, the electronic device **180** is engaged with the first section **102a**, and magnetic elements in the electronic device **180** magnetically couple to magnetic elements in the first section **102a**. Further, the second section **102b** can fold such that first segment **108a**, the second segment **108b**, and the third segment **108c** form a triangular support for the electronic device **180**. As shown in the enlarged view, due in part to the layer **124b** (also shown in FIG. 3) being separate from a layer **124c** on the third segment **108c**, a portion of the second layer **122b** located on the first section **102a** engages a portion of the second layer **122b** located on the second section **102b**. Due in part to the second layer **122b** being formed from a polyurethane material, the second layer **122b** provides a frictional force between the portion of the second layer **122b** located on the first section **102a** in contact with the portion of the second layer **122b** located on the second section **102b**. The frictional forces between the portions of the second layer **122b** are greater than frictional forces between soft, non-abrasive layers, such as microfiber. As a result, the accessory device **100** can resist unwanted movement when, for example, a user interacts with the display **186**. Also, the third segment **108c** provide direct support

11

through engagement with the first section **102a**. However, in this configuration, the third segment **108c** may not be magnetically coupled with the first section **102a**, and the weight of the electronic device **180** applies a force to the third segment **108c** that maintains the triangular support.

FIG. **12** illustrates a side view of the accessory device supporting the electronic device in an alternate configuration. The user of the electronic device **180** can also interact with the display **186** of the electronic device **180** in this configuration. As shown, the first segment **108a**, the second segment **108b**, and the third segment **108c** can fold to form an alternate triangular support for the electronic device **180**. The first section **102a** is rigid and strong enough to support the electronic device **180** without bowing or warping, and accordingly, the first section **102a** is not affected by the weight of the electronic device **180**.

FIG. **13** illustrates a plan view of the accessory device **100**, showing the camera assembly **184** and the flash module **185** of the electronic device **180** positioned in the opening **106** of the accessory device **100**. As shown, the camera assembly **184** is allowed to capture images for the electronic device **180**, and the flash module **185** may emit light to enhance the image capturing. Also, when the camera assembly **184** is in the opening **106**, the reinforcement layer **115** surrounds the camera assembly **184**.

FIG. **14** illustrates a side view of the accessory device **100** and the electronic device **180** shown in FIG. **13**, showing the camera assembly **184** protruding through the opening **106** of the accessory device **100**. A partial cross sectional view of the first section **102a** is shown to show the reinforcement layer **115**. When a force (denoted by two-sided arrow **187**) is applied to the electronic device **180** that causes lateral movement in either direction of the two-sided arrow **187**, a corresponding lateral movement of the camera assembly **184** also occurs. However, due in part to the camera assembly **184** being positioned in the opening **106**, the camera assembly **184** can engage one or more surfaces that define the opening **106**, and limit the movement of the camera assembly **184**, thereby limiting the movement of the electronic device **180**. This allows magnetic elements (not shown FIG. **14**) in the first section **102a** to remain magnetically coupled with magnetic elements (not shown FIG. **14**) in the electronic device **180**. Accordingly, the opening **106** provides a mechanical stop or interface when relative lateral movement of the electronic device **180** occurs.

FIG. **15** illustrates a side view of the electronic device **180** positioned between the first section **102a** and the second section **102b** of the accessory device **100**, showing the first section **102a** and the second section **102b** extending beyond the electronic device **180**. As shown, both the first section **102a** and the second section **102b** are engaged with the electronic device **180**. Further, magnetic elements in the first section **102a** and in the second section **102b** may magnetically couple with magnetic elements in the electronic device **180**. Moreover, the electronic device **180** may include an audio module **188**, such as a speaker module, designed to generate acoustical energy in the form of audible sound. Audio modules of this kind are known in the art to include a permanent magnet. In some instances, when the accessory device **100** is exposed to heat, a material (or materials) of the accessory device **100** may bend or warp. For example, excess heat may cause the first segment **108a** and the second segment **108b** to extend away and at least partially disengage the electronic device **180**, as indicated by the dotted lines. However, the accessory device **100** may include magnetic elements **114t** in a location corresponding to the location of the audio module **188** such that magnetic ele-

12

ments **114t** magnetically couple with the audio module **188**, and in particular, a permanent magnet of the audio module **188**. The magnetic attraction force between the magnetic elements **114t** and the permanent magnet of the audio module **188** may cause the first segment **108a** and the second segment **108b** to remain engaged with the electronic device **180**, and overcome issues related to excess heat. As shown, the magnetic elements **114t** are located in the first segment **108a**. However, the magnetic elements **114t** can be located in the second segment **108b** in order to accommodate a different location of the audio module **188** in the electronic device **180**.

FIG. **16** illustrates a plan view of the electronic device **180** and the accessory device shown in FIG. **15**, showing the first section **102a** extending beyond the electronic device **180** in multiple dimensions. The electronic device **180** is covered by the first section **102a** and is denoted by a dotted line. The accessory device **100** may include a dimension **142a** that allows the first section **102a** to extend beyond a first edge **192a** and a second edge **192b** of the electronic device **180**. The accessory device **100** may include a dimension **142b** that allows the first section **102a** to extend beyond a third edge **192c** and a fourth edge **192d** of the electronic device **180**. Accordingly, the first section **102a** may extend beyond the electronic device **180** along both the X- and Y-axes. The second section **102b** (not shown in FIG. **16**) may include any dimensional features described for the first section **102a**.

FIGS. **17** and **18** show that the accessory device **100** includes a sufficient number of magnetic elements hold and retain the electronic device **180**, even when the electronic device **180** and the accessory device **100** are upright such that gravitational forces are acting on the electronic device **180** that would otherwise push the electronic device **180** along a vertical Y-axis and off of the accessory device **100**. FIG. **17** illustrates a side view of the accessory device **100** and the electronic device **180**, showing the electronic device **180** engaged with the first section **102a**. The magnetic elements (not labeled) in the first section **102a** couple with magnetic elements (not shown in FIG. **17**) of the electronic device **180** and provide a sufficient magnetic attraction force to such that gravitational forces and the weight of the electronic device **180** are countered, and the electronic device **180** remains engaged with the accessory device **100** along the first section **102a**.

FIG. **18** illustrates a side view of the accessory device **100** and the electronic device **180**, showing the electronic device **180** engaged with the second section **102b**. The magnetic elements (not labeled) in the second section **102b** couple with magnetic elements (not shown in FIG. **18**) of the electronic device **180** and provide a sufficient magnetic attraction force to such that gravitational forces and the weight of the electronic device **180** are countered, and the electronic device **180** remains engaged with the accessory device **100** along the second section **102b**.

FIGS. **19** and **20** show an alternate embodiment of an accessory device **200**. It should be noted that the accessory device **200** may include any features described herein for the accessory device **100**.

FIG. **19** illustrates a side view of an alternate embodiment of an accessory device **200** holding the electronic device **180**, further showing an object **240** coupled with an edge of the electronic device **180**. The object **240** may include a digital stylus designed to interact with the display **186** (not shown in FIG. **19**) when the display **186** includes touch-screen capabilities or other input capabilities initiated by the object **240**. The accessory device **200** may include a retaining element **234** coupled with a first section **202a** and a

second section of the accessory device 200. The retaining element 234 may include a satchel, or other type of strap, that engages and retains the object 240 such that the object 240 remains engaged with the electronic device 180 and/or the accessory device 200. The retaining element 234 may include elastic capabilities to provide additional retaining forces. The retaining element 234 may permanently couple with at least one of the first section 202a or the second section 202b. The permanent coupling may be through adhesives, sewing, melting, and/or other bonding techniques. Alternatively, the retaining element 234 may be removably coupled with at least one of the first section 202a and the second section 202b. The removable coupling may include reusable adhesive materials, hook and loop features (such as Velcro), or magnetic elements. As shown, the retaining element 234 protrudes beyond surfaces of the first section 202a and the second section 202b. However, in some embodiments (not shown in FIG. 19), each of the first section 202a and the second section 202b include a recess that receives the retaining element 234 such that the retaining element is flush, or co-planar, with a surface of the first section 202a and with a surface of the second section 202b.

FIG. 20 illustrates a side view of the accessory device 200 and the electronic device 180 shown in FIG. 19, with the object 240 removed. As shown, the retaining element 234 may contract so as to not extend in an unwanted manner, and such that it is not recognizable to a user that the retaining element 234 includes elastic properties in order to hold the object 240 (shown in FIG. 19). In this regard, the retaining element 234 may provide additional support that maintains the first section 202a and the second section 202b engaged with the electronic device 180, as well as promote a low-profile design of the accessory device 200.

The various aspects, embodiments, implementations or features of the described embodiments can be used separately or in any combination. Various aspects of the described embodiments can be implemented by software, hardware or a combination of hardware and software. The described embodiments can also be embodied as computer readable code on a computer readable medium for controlling manufacturing operations or as computer readable code on a computer readable medium for controlling a manufacturing line. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system. Examples of the computer readable medium include read-only memory, random-access memory, CD-ROMs, HDDs, DVDs, magnetic tape, and optical data storage devices. The computer readable medium can also be distributed over network-coupled computer systems so that the computer readable code is stored and executed in a distributed fashion.

The foregoing description, for purposes of explanation, used specific nomenclature to provide a thorough understanding of the described embodiments. However, it will be apparent to one skilled in the art that the specific details are not required in order to practice the described embodiments. Thus, the foregoing descriptions of the specific embodiments described herein are presented for purposes of illustration and description. They are not targeted to be exhaustive or to limit the embodiments to the precise forms disclosed. It will be apparent to one of ordinary skill in the art that many modifications and variations are possible in view of the above teachings.

What is claimed is:

1. An accessory device for a portable electronic device, the accessory device comprising:

a first section that defines a receiving surface for the portable electronic device, the first section comprising a first magnetic element and a second magnetic element; and

a second section that is coupled with the first section and capable of covering the portable electronic device, the second section comprising:

a first segment comprising a third magnetic element capable of magnetically coupling with the first magnetic element, the first segment further comprising a fourth magnetic element capable of magnetically coupling with the second magnetic element,

a second segment rotationally coupled with the first segment, and

a third segment rotationally coupled with the second segment, wherein when the portable electronic device is positioned on the receiving surface and the second section covers the portable electronic device, the first section and second section extend laterally beyond edges of the portable electronic device.

2. The accessory device of claim 1, wherein the first section comprises a first dimension such that the first section extends beyond a first edge of the portable electronic device and a second edge of the portable electronic device.

3. The accessory device of claim 2, wherein the first section comprises a second dimension such that the first section extends beyond a third edge of the portable electronic device.

4. The accessory device of claim 3, wherein the second section extends beyond the first edge, the second edge, and the third edge.

5. The accessory device of claim 1, further comprising a magnetic element carried by the second section, the magnetic element configured to form a magnetic coupling with a magnetic element of an audio module located in the portable electronic device, wherein the magnetic coupling maintains the second section engaged with the portable electronic device.

6. The accessory device of claim 1, wherein the first segment lacks a magnetic coupling with the second segment.

7. An accessory device for a portable electronic device, the accessory device comprising:

a first section that defines a receiving surface for the portable electronic device, the first section further comprising a back surface opposite the receiving surface; a first magnetic element and a second magnetic element embedded in the first section; and

a second section coupled with the first section and capable of covering the portable electronic device, the second section comprising:

a first segment comprising a third magnetic element, and

a second segment rotationally coupled with the first segment,

wherein:

a first magnetic coupling between the first magnetic element and the third magnetic element causes an alignment of the second section with the back surface, and

a second magnetic coupling between the second magnetic element and the third magnetic element cause the first segment to remain engaged with the second segment.

8. The accessory device of claim 7, further comprising a hinge that connects the first section with the second section.

9. The accessory device of claim 8, wherein the second segment is closer to the hinge than the first segment.

15

10. The accessory device of claim 7, wherein the first magnetic coupling causes the second section to align with the back surface prior to the second section lying flat on the back surface.

11. The accessory device of claim 7, wherein the first segment lacks a magnetic coupling with the second segment.

12. The accessory device of claim 7, further comprising: an opening in the first section; and a reinforcement layer embedded in the first section and surrounding the opening, the reinforcement layer configured to maintain a camera assembly of the portable electronic device within the opening.

13. An accessory device for a portable electronic device, the accessory device comprising:

a first section comprising a first surface and a second surface opposite the first surface, the first section carrying a first magnetic element and a second magnetic element; and

a second section carrying a third magnetic element and a fourth magnetic element, the second section pivotally coupled to the first section and capable of a magnetic engagement with the second surface at i) a first magnetic attachment between the first magnetic element and the third magnetic element magnetically attached to and aligned with the first magnetic element and ii) a second magnetic attachment between the second magnetic element and the fourth magnetic element magnetically attached to and offset from the second magnetic element, wherein without the first magnetic attachment, the second magnetic attachment alone is insufficient to maintain the magnetic engagement.

14. The accessory device of claim 13, wherein:

when the magnetic engagement is present, the accessory device is in a closed configuration in which the second surface of the first section is in a surface-to-surface contact with the second section; and

when the magnetic engagement is no longer maintained, the accessory device automatically transitions to an open configuration in which the first section is out of the surface-to-surface contact with the second section.

15. The accessory device of claim 13, further comprising a hinge that pivotally couples the first section to the second

16

section, wherein the first surface is configured to carry the portable electronic device such that the second section is capable of covering the portable electronic device when the portable electronic device is at the first surface.

16. The accessory device of claim 13, wherein a magnitude of a magnetic attraction force at the first magnetic attachment is greater than a magnitude of a magnetic attraction force at the second magnetic attachment such that, when an amount of an applied force necessary to overcome the magnetic attraction force at the first magnetic attachment is applied to the first magnetic attachment, the first magnetic attachment and the second magnetic attachment become detached.

17. The accessory device of claim 16, wherein the detachment of the first magnetic attachment automatically initiates the detachment of the second magnetic attachment as a result of the applied force.

18. The accessory device of claim 13, wherein:

the first magnetic attachment comprises a first magnetic circuit that is formed between a first magnetic element of the first section and a first magnetic element of the second section; and

the second magnetic attachment comprises a second magnetic circuit that is formed between a second magnetic element of the first section and a second magnetic element of the second section, wherein a break in the first magnetic circuit initiates a subsequent break in the second magnetic circuit.

19. The accessory device of claim 13, wherein a magnitude of a magnetic attraction force at the first magnetic attachment is greater than a magnitude of a magnetic attraction force at the second magnetic attachment such that, upon removal of the magnetic attraction force at the first magnetic attachment, a remaining magnetic attraction force comprising the magnetic attraction force at the second magnetic attachment is insufficient to maintain the magnetic engagement.

20. The accessory device of claim 13, further comprising an opening formed in the first section.

* * * * *